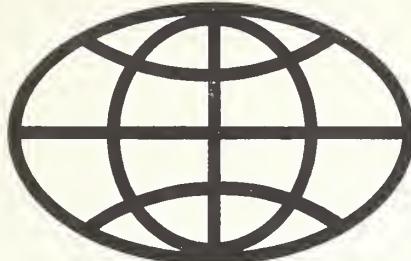


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WORLD DEMAND PROSPECTS FOR **AGRICULTURAL  
EXPORTS**

OF LESS DEVELOPED  
COUNTRIES IN 1980



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FOREIGN AGRICULTURAL ECONOMIC REPORT NO. 60

U.S. DEPARTMENT OF AGRICULTURE

• ECONOMIC RESEARCH SERVICE

## ABSTRACT

World supply, demand, and trade of wheat, rice, coarse grains, oilseeds, cotton, bananas, and beverage crops are projected to 1980 under three basic alternative sets regarding economic development, production growth rates of commodities, and policies of major developed trading countries. Focus is centered on world demand prospects for exports of the less developed countries. Commodity export prospects are: Wheat fair; rice poor; coarse grains good; oilcake good; vegetable oils poor; cotton textiles strong; cotton lint weak; bananas good; and tropical beverages fair. General implications drawn from commodity projections are: Supplies of most foods and fibers appear likely to exceed demand at current prices; demand of the LDC's for agricultural imports may increase rapidly; increased exports of commodities with an inelastic price elasticity of demand may be associated with lower export earnings; LDC's earnings from commodities supplied by both LDC's and developed exporters can be drastically affected by policies of the latter; LDC's may find it difficult to achieve a consensus on trade policy, since the less developed area includes both importers and exporters.

Key words: World supply, demand, trade, 1980 projections, wheat, rice, coarse grains, oilseeds, cotton, bananas, tropical beverages, less developed countries.

## FOREWORD

This report summarizes the findings of the research project on "Demand Prospects for Agricultural Products of Less Developed Countries" conducted by the Economic Research Service under a participating agency service agreement for the Agency for International Development. Research under this project was carried out in three phases: Phase A, a historical analysis of agricultural exports of less developed countries; Phase B, an analysis of demand prospects in 1980 for selected agricultural products in importing countries; and Phase C, an analysis of policy implications of these estimated world demand prospects for export earnings from selected agricultural products in less developed countries.

Separate aspects of this project are being published in a series that includes studies on wheat, rice, feed grains, cotton, oilseeds and products, coffee, cocoa, tea, bananas, citrus fruits, and selected vegetable crops and trade policies. Results of the studies on citrus fruits and vegetables are not included in this summary as the work on these commodities has not been completed. Separate reports have been published as part of an additional series on world trade in these commodities, incorporating the work of Phase A, mentioned above.

National development plans and programs in many less developed countries (LDC's) are strongly dependent upon the fortunes of their agricultural exports. For example, in 1965 agricultural exports in 66 countries accounted for more than 50 percent of each country's total export earnings. Agricultural exports in 50 countries accounted for more than 70 percent of total export earnings. This heavy dependency upon agricultural exports is critical to the economic development of the LDC's, which have expanding foreign exchange requirements to pay for increased imports of goods, technical skills, and capital equipment. Therefore, since agricultural exports are the major source of foreign exchange earnings, there is growing concern that exports will not keep pace with needs.

The major objective of the research project summarized here was to estimate the long-term world demand prospects for selected agricultural products exported by the less developed countries and to outline the implications of their production and trade policies and programs that are designed to expand agricultural exports. A firm understanding of the world demand structure is a requisite for formulating agricultural development policies in the LDC's.

The research on demand prospects for agricultural products of less developed countries was conducted under the direction of an ERS Technical Advisory Committee, consisting of Louis F. Herrmann, Chairman, and Arthur B. Mackie and Anthony S. Rojko, who served as advisors and research leaders.



Senior Agricultural Adviser  
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## PREFACE

This study is based primarily on the studies listed on the inside back cover of this report. This series of studies was conducted by a research team under the guidance of the authors of the present report. The studies were prepared by the following Economic Research Service staff members: James J. Naive\*, John E. Hutchison, and Sheldon K. Tsu for wheat; James F. Keefer\*, Robert D. Barry, and Amjad H. Gill for rice; Donald W. Regier\* and O. Halbert Goolsby for feed grain; Anthony S. Rojko\* and Francis S. Urban for total grains; Lyle Moe\*, Malek Mohtadi, Donn Reimund, and Arthur Coffing for oilseeds; Richard S. Magleby\* and Edmond Missiaen for cotton; Daniel E. Timms\* for beverage crops; Arthur B. Mackie\* and Jon E. Falck for bananas; Arthur B. Mackie\* and J. Lawrence Blum for citrus; Joseph R. Barse\* for trade policies and Japanese food strategies; A. Nicholas Filippello\* for the Japanese grain-livestock economy; Anthony S. Rojko\*, Francis S. Urban, and A. Nicholas Filippello for development of the economic framework for the world grain model; and Francis S. Urban\* and A. Nicholas Filippello for implementation and computerization of grain model.

The technical aspects of supply and demand data, their relationships, and projection models for the commodities analyzed are not discussed in detail in this report. These aspects are included in the separate reports. Metric tons and U.S. dollars are used throughout this report. The countries included in the three major regions—developed, less developed, and central plan—are given at the end of this report.

Many individuals gave valuable assistance throughout this project. Appreciation is extended to Quentin M. West, Raymond P. Christensen, Carmen O. Nohre, and Joseph W. Willett for their administrative support and constructive ideas; to Charles A. Gibbons for his counsel on data problems; to Edith C. Allen for her statistical support; and to James J. Naive for his unstinting effort in helping us prepare this report.

In addition, the authors are indebted to Louis F. Herrmann, chairman of the project's technical advisory committee, Martin E. Abel, chairman at the start of the project, and the members of the research team for their individual and joint contributions. The authors, are, however, fully responsible for the choice of data and information used and for the interpretations and conclusions drawn.

\*Project leaders.

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## SUMMARY

World demand projections to 1980 for major commodities indicate that wheat prospects are fair, with import demand forecast to be sluggish in developed areas but potentially strong in less developed countries (LDC's) if concessional terms of trade are available. Increased feed use would reduce downward pressure on prices. Some increase in the share of world market is possible for LDC exporters, largely Argentina. Potential export earnings in South Asia could be offset by subsidy costs and quality factors.

The outlook for rice is poor. Continuation of the "Green Revolution" would result in lower world import demand, a demand traditionally centered in the LDC's. Import demand in the developed area is expected to rise moderately, but the increase will be small relative to potential export supplies—from both developed and less developed exporters. Consequently, continued downward pressures on prices are expected.

Demand prospects for coarse grains are good. Import demand in developed areas, particularly Japan, is expected to be strong. Given concessional terms of trade and rapid expansion in the livestock industry, import demand in the LDC's could increase sharply. Lower internal grain prices in the developed importers, particularly in the European Community (EC), could give trade an additional boost. Some LDC exporters might not fully share in the expansion because their port facilities are limited in handling large cargo vessels. On the other hand, maintenance of very high internal prices through limited access could lead to self-sufficiency in total grains in the EC, thereby lowering LDC export prospects.

Demand prospects are good for oilcake, but poor for vegetable oils. Import demand for oilcake should continue strong because of an expanding world livestock economy. High grain prices in developed importing countries (particularly in the EC) would continue to make oilcake an attractive feed substitute. For the developed area, very little growth in import demand for oil is projected. For less developed countries, any substantial increase in import demand for oils is contingent on concessional sales.

Prospects are good for cotton textiles but fair for lint. The import demand is strong for textiles in the developed countries but weak for lint. The LDC's are expected to increase their consumption of both textiles and lint, but domestic demand for textiles could be weak if economic growth in these countries falters. LDC exporters of textiles and lint are expected to increase their share of the world market.

Demand for manmade fibers is expected to increase more rapidly than that for cotton.

The outlook for bananas is good. Import demand is expected to be sluggish in highly developed countries but potentially good to strong in those rapidly growing developed countries where per capita consumption is expected to rise rapidly under the impetus of rising income. Lower prices would stimulate the volume of exports, but could actually reduce export earnings of the LDC's.

Demand prospects for tropical beverages are fair. For coffee, import demand is projected to be sluggish in North America, but stronger in other developed countries where substitution of coffee for tea is apparent. For tea, growth in import demand is expected to be sluggish in developed countries but good in LDC's. Prospects for total export earnings from tea are generally fair to poor. For cocoa, import demand prospects are good—an expected growth in consumption in Western European and central plan countries would increase export potentials. Export potentials could be further enhanced with reduction in import restrictions in these countries.

General implications that can be drawn from the specific commodity projections are:

Supplies of most crops and fibers appear likely to exceed demand at current prices. Prices are likely to decline, therefore, unless major suppliers adjust production or marketing.

Much of the increase in production of food and fiber in the LDC's would be absorbed by an increase in domestic consumption.

Per capita nutritional levels of the LDC's may be expected to improve.

Demand of the LDC's for agricultural imports may increase rapidly, particularly for commodities which they do not produce. The LDC's could account for an increasing share of world agricultural imports.

Increased LDC imports would be contingent on concessional sales of foods, feeds, and fibers to the LDC's.

The relationship between world price levels and volume of trade may be indeterminate under certain conditions: Lower world prices may be associated with decreased trade if production increases occur in importing countries (as is expected in rice) and import

demand is lowered. Lower world prices may be associated with increased trade if production increases occur in exporting countries and exports are increased.

Increased exports of commodities with an inelastic price elasticity of demand at the world level may be associated with lower export earnings.

Export earnings for commodities supplied only or principally by LDC's—such as tropical fruits and beverages—are expected to rise with projected income growth in importing countries under continuation of current price and export policies. If exports were increased relative to growth in demand, prices and export earnings would be reduced. Reduced exports relative to growth in demand might raise prices and export earnings, but consumption of substitutes might rise, weakening prospects for gains in earnings.

Less developed countries' earnings prospects for commodities supplied by both LDC's and developed exporters can be drastically affected by the policies of the latter. The optimum strategy for LDC's would be to increase exports to the point that major developed exporters might find it expedient to accommodate, possibly through some cooperative international effort. Expanding exports beyond that point may cause the developed exporters to adopt market sharing policies that would adversely affect LDC export earnings.

Benefits to LDC's from removal of restrictions and freer trade may be minimal if developed exporters share in the increase, unless special trade arrangements are made in favor of the LDC's. Specifically, in the case of grains, where the developed exporters have the largest share of the market, they would gain relatively more from an expanded import market than the LDC exporters with current market shares.

Accelerating production in the face of falling export earnings could lead to conflict or inconsistency of assumptions. For example, lower export earnings would discourage economic growth. This is contrary to the assumption made in one of the alternative projections in this research, where both production and economic growth were assumed to increase.

LDC's may find it difficult to achieve a consensus on trade policy, since the less developed area includes both importers and exporters. Lower world prices benefiting importers would adversely affect exporters, and higher world prices benefiting exporters would adversely affect imports.

These conclusions are based on three basic projection sets, each within a supply-demand framework. Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Under sets II and III, respectively, higher and lower rates of agricultural productivity and economic growth in the less developed countries would prevail than under set I. Major emphasis is placed on sets I and II, since they are more consistent with current national development plans to accelerate economic growth. Set III illustrates the effect of shortfalls in development objectives of the LDC's on export earnings. Set II included subsets to evaluate the effect of varying policies in major developed trading countries.

Value of exports in the LDC's for the products covered is projected to reach a level of \$10.7 billion in 1980, indicating an annual growth rate of 2 percent from the 1964-66 base period. At the same time, the projected value of imports for the same commodities—\$6.7 billion—represents an increase of 3 percent a year. Thus, the projected trade balance for the LDC's in these commodities is less favorable, since the growth in their import costs would exceed their growth in export earnings.

# WORLD DEMAND PROSPECTS FOR AGRICULTURAL EXPORTS OF LESS DEVELOPED COUNTRIES IN 1980

By  
Anthony S. Rojko and Arthur B. Mackie<sup>1</sup>

## I.—INTRODUCTION

In recent years, doubts have been raised about the adequacy of foreign trade to stimulate economic growth of the less developed countries. These doubts have arisen primarily because demand for the exports of less developed countries has not risen as rapidly as their exportable supplies of goods. Consequently, prices of their goods have tended to decline over the long run. Since the prices of imports by less developed countries have tended to rise, the purchasing power of their exports has fallen. The impact of these trends on economic growth in the less developed countries has been difficult to offset either by the expansion of their exports or the expansion of economic aid from the developed countries.

### The Problem

What had often been considered a linchpin of national economic development plans—agricultural exports—are now showing signs of being an insufficient generating force or, at least, a disappointing connecting link between economic development planning and economic growth. With the continuation of these trends, many proposals have been generated for collective international action.

Instability of exports earnings and the apparent long-term decline in the terms of trade for primary products have been cited as a source of great concern among the less developed countries (42).<sup>2</sup> The effect of these conditions on economic development in the less developed countries has not been easily offset by other programs or policies. Instability of export earnings adds to the problems created by price uncertainty and often distorts optimum resource allocation and use, while declining terms of trade create balance-of-payment problems when imports are not held in check. And, if restrictions are imposed to check imports, the rate of economic growth is thwarted.

National development plans and programs in many less developed countries (LDC's) have been strongly dependent on the fortunes of these countries' agricultural exports. For example, in 1965 there were 66 countries whose agricultural exports accounted for more than 50 percent of total export earnings (table 1). There were more than 50 countries with agricultural export earnings of more than 70 percent of total export earnings. This heavy dependency on one type of export is critical since the economic transformation of the traditional societies of the LDC's to modern economies requires an increased importation of goods, technical skills, and capital equipment—all of which must be paid for in foreign exchange. Therefore, since agricultural exports are the major source of foreign exchange earnings, there is a growing concern that exports alone will not keep pace with developmental needs.

The role of trade in the process of economic development of the LDC's in the much-discussed dilemma facing the less developed countries was first put in simple terms of "trade not aid." But the dialogue has turned more toward a discussion of how trade and aid can help achieve economic growth and development in the LDC's. The dilemma facing the LDC's was clarified by Meier:

In the course of development, the rate of growth in imports tends to be more rapid than the rate of growth of national output, and the demand for imports tends to exceed the export-based capacity to import...especially during the early phases when the increase in investment is sizeable and structural changes are considerable. The poor country then confronts a conflict between accelerating its internal development and maintaining external balance. (46)

### Purpose of Study

The major objective of this study is to estimate world demand prospects in 1980 for selected agricultural products exported by the less developed

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<sup>2</sup> Underscored numbers in parentheses refer to references listed at the end of this report.

countries and to outline the implications of production and trade policies and programs in these countries designed to expand agricultural exports. Inasmuch as these products are in the main sold in developed countries, it is anticipated that their aggregate demand is inelastic. In consequence, to the extent that the LDC's collectively increase exportable supplies of these products, their total foreign exchange revenues may be diminished rather than increased. However, for some commodities and developed countries, the demand elasticities may be considerably higher. Trade among the LDC's themselves may benefit from capitalizing upon comparative advantage. A firm understanding of the entire demand structure for agricultural commodities must be obtained if competent advice and assistance is to be given on agricultural development policies in the LDC's.

The analysis of the demand prospects and export earnings potentials of less developed countries was limited to those selected agricultural commodities that accounted for about 22 percent of total export earnings of the LDC's in 1964-66. These selected commodities include (1) the cereals—wheat, rice, and coarse grains; (2) the tropical beverage crops—coffee, cocoa, and tea; (3) oilseeds and products; (4) cotton; (5) vegetables; and (6) tropical fruits—citrus and bananas.<sup>3</sup> The results of analyses of these commodities should provide an overview of the magnitude of current and future world trade in agricultural products; identify the pattern of international trade flows between producers and major markets; indicate the relative importance of selected commodities in the exchange earnings of LDC's; and outline the importance of different supply, demand, and policy conditions on export earnings prospects of the LDC's.

## II.—AGRICULTURAL TRADE IN PERSPECTIVE

World trade in agricultural products<sup>4</sup> in 1964-66 was \$40 billion, or about one-fifth of the value of total trade (table 2). Agricultural trade, like total trade, is primarily among the developed countries. For example, 52 percent and 34 percent of total and world agricultural trade was intra-developed-area trade (table 3). The developed countries accounted for 51 percent of world agricultural exports but 66 percent of world agricultural imports. On the other hand, the less developed countries accounted for 39 percent of world agricultural exports, but only 21 percent of world agricultural imports. While exports of agricultural products by the LDC's to the developed countries represented 27 percent of total world trade in agricultural products, agricultural trade between the LDC's and the central plan countries was only 14 percent—7 percent intra-LDC's and 7 percent between the LDC's and the central plan countries.

From the standpoint of market outlets for the agricultural exports of the LDC's, 70 percent go to the developed countries (table 4). The central plan countries take only 12 percent. The LDC's themselves represent their second largest market outlet—18 percent in 1964-66. The United States and Canada represent a large market for the exports of the LDC's, accounting for 21 percent of their agricultural exports. The largest single market is Western Europe, accounting for 41 percent of their agricultural exports. However, trade restrictions and preferential tariffs, especially in the European Community and central plan countries, limit expansion of exports for many of the less developed countries. Increased access to these markets will, no doubt, be a major policy goal.

Japan is also a major outlet for the products of the LDC's. For example, while 8 percent of total LDC exports in 1964-66 went to Japan, only 6 percent were shipped to all the countries in Eastern Europe, to the USSR, and to Mainland China. The comparison is only a little less dramatic for agricultural exports as for total exports. In 1964-66, Japan accounted for 7 percent and the central plan countries accounted for 12 percent of the agricultural exports of the LDC's. The absolute value of total LDC's exports to Japan was greater than for all of central plan countries, but the absolute value of agricultural exports to Japan was only 54 percent of the value for central plan countries. The larger absolute and relative share of Japan's total LDC exports no doubt reflects the fact that Japan has a higher dependency on the LDC's for raw material than the central plan countries have.

### Importance of Study Commodities

The value of the eight major commodity groups selected for detailed demand analyses in the demand study—cereals, cotton, fruits, oilseeds and products, coffee, cocoa, tea, and vegetables—represented 52 percent of the total agricultural exports of the LDC's in 1964-66. Of these selected commodities, coffee was the largest export earner—accounting for almost 15 percent of

<sup>3</sup>Research on citrus and vegetables is not completed and is not reported in this summary.

<sup>4</sup>As defined in this study, agricultural trade includes Standard International Trade Classification (SITC) Sections 0, 1, 2, and 4 but excludes Division 03, 24, 25, 27, and 28.

Table 1.--Distribution of countries by level of dependency upon agricultural exports and percentage of total exports, 1965

Dependency level: agricultural share of total exports	Developed countries	Less developed countries
Not dependent:		
10 percent and below	Fed. Rep. of Germany, Japan, Switzerland, Czechoslovakia*	Bermuda, Libya, Bolivia, Chile, Venezuela, Iran, Iraq, Zambia, Netherlands Antilles
10 to 19 percent	United Kingdom, Austria, Italy, Belgium-Luxembourg	Liberia, Trinidad and Tobago, Hong Kong, Sierra Leone, Surinam, Macau
20 to 29 percent	France, Sweden, USA, Malta, Poland*, Hungary*, USSR*	
Dependent:		
30 to 39 percent	Netherlands, Norway, Canada, Portugal, Yugoslavia*	Israel, India, So. Korea, Bahamas, Antigua, Sarawak
40 to 49 percent	Rep. of So. Africa, Finland	Jamaica, Gabon, So. Rhodesia, Cent. African Rep.
Highly dependent:		
50 to 59 percent	Spain, Denmark	Malaysia, Singapore, Cyprus, Peru, Mexico, Congo (Braz.)
60 to 69 percent	Ireland	Lebanon, Panama, Taiwan, Jordan, Brunei, Papua
70 to 79 percent	Greece	Nigeria, UAR (Egypt), Colombia, Kenya, Barbados, Greenland, Morocco, Ghana, Fiji Islands, Thailand
80 to 89 percent	Australia	Honduras, Cameroon, Tanzania, Brazil, Dominican Rep., El Salvador, Philippines, Tunisia, Reunion, Uganda, Guatemala, British Honduras, Nicaragua, Syria, Costa Rica
Absolute dependent:		
90 to 100 percent	New Zealand, Iceland	Ecuador, Ethiopia, Fr. Polynesia, Chad, Malagasy Rep., New Guinea, Malawi, Turkey, Ivory Coast, Argentina, Mauritius, Sabah, Togo, Burma, So. Vietnam, Mali, Martinique, Faeroe Islands, Guadeloupe, Grenada, Senegal, Somalia, Gambia, Ceylon, Sudan, Br. Solomon Islands, Cambodia, Pakistan

\* Central plan countries.

Source: (23) (24).

Table 2.--World trade in agricultural products, 1964-66 average

Exporting region	Importing region				
	Developed	Less developed	Central plan	Residual	World
	developed	developed	plan	Residual	World
	...	...	...	...	...
<u>Million U.S. dollars f.o.b.</u>					
Developed:	...	...	...	...	...
Total exports	96,436	26,910	5,144	480	128,970
Agricultural exports <u>1/</u>	13,622	4,733	1,827	26	20,208
<u>Percent</u>					
% agricultural	14	18	35	5	16
<u>Million U.S. dollars f.o.b.</u>					
Less developed:	...	...	...	...	...
Total exports	26,377	7,733	2,250	267	36,627
Agricultural exports <u>1/</u>	10,791	2,800	1,820	42	15,453
<u>Percent</u>					
% agricultural	41	36	81	16	42
<u>Million U.S. dollars f.o.b.</u>					
Central plan:	...	...	...	...	...
Total exports	4,830	2,997	13,863	43	21,733
Agricultural exports <u>1/</u>	1,955	740	1,620	43	4,358
<u>Percent</u>					
% agricultural	40	25	12	100	20
<u>Million U.S. dollars f.o.b.</u>					
World:	...	...	...	...	...
Total exports	127,643	37,640	21,257	790	187,330
Agricultural exports <u>1/</u>	26,368	8,273	5,267	111	40,019
<u>Percent</u>					
% agricultural	21	23	25	14	21

1/ Includes SITC sections 0, 1, 2, and 4, excluding division 03 of section 0 and divisions 24, 25, 27, and 28 of section 2.

Source: (23), (62) and (63)

Table 3.--Distribution of world trade in agricultural products, 1964-66 average

Exporting region	Importing region				
	Developed	Less developed	Central plan	World	
	<u>Percent</u>				
Developed:					
Total exports	52	14	3	69	
Agricultural	34	12	5	51	
Less developed:					
Total exports	14	4	1	19	
Agricultural	27	7	5	39	
Central plan:					
Total exports	2	2	8	12	
Agricultural	5	2	3	10	
World:					
Total exports	68	20	12	100	
Agricultural	66	21	13	100	

Source: (23), (62), and (63)

Table 4.--Major markets for exports of less developed countries, 1964-66 average

Major markets	Exports		Regional share	
	Total	Agricultural	Total	Agricultural
	<u>Million U.S. dollars</u>		<u>Percent</u>	
Developed:				
North America	26,377	10,791	72	70
Western Europe	7,590	3,290	21	21
Japan	15,050	6,321	41	41
Others 1/	2,880	980	8	7
Central plan	857	200	2	1
Less developed				
Central plan	2,250	1,820	6	12
Residual 2/	7,733	2,800	21	18
World	267	42	1	---
	36,627	15,453	100	100

1/ Australia, New Zealand, and Rep. of South Africa.

2/ Trade not specifically accounted for by country of destination.

Source: (23), (62), and (63)

export earnings from agricultural products. Fibers were a close second with 11 percent, with cereals not far behind at 9 percent of agricultural export earnings of the LDC's (table 5). Fruits, and oilseeds and products were about of equal importance as export earners at more than 4 percent. Tea and cocoa each accounted for more than 3 percent. Vegetables were of much less importance at 1 percent.

The relative importance of these commodities in the export earnings of the various less developed regions varied considerably. For example, fibers and coffee were the chief export earners in Central America and Mexico, accounting for 37 percent, while coffee and cereals, at 35 percent, were of major

importance to South America. In East and West Africa, the chief export earners were coffee, cocoa, and oilseeds and products, accounting for a total of 61 percent. At 47 percent, textile fibers and fruits were of major importance in North Africa and West Asia. In South Asia, tea and fibers accounted for 49 percent, while cereals alone accounted for 61 percent of export earnings in Southeast Asia. In East Asia and the Pacific Islands, the largest single export earner was oilseeds and products at 12 percent. Part of the explanation for the low contribution of a single commodity group to the export earnings in this region was the relatively low contribution—37 percent—of total agricultural trade to total export earnings.

### III.—DEMAND ANALYSIS

The analytical base for determining the demand prospects for selected agricultural exports of the less developed countries is discussed in this chapter. Of primary concern here are the two types of factors that affect demand for the selected commodities. One type of factors—those external to agriculture, such as population, tastes, income, and preferences—affect the level of consumption over time. The second type, prices, are jointly determined within agriculture and affect the distribution and relative importance of different commodities in the consumption function for agricultural products in both the short and long run. The first type of factors evolve out of the development process, while the second type result from changes at any point in time. Both types affect the commodity composition of demand in countries at all stages of economic growth and development, and thus affect the total demand for these commodities. In the following discussion, these factors affecting demand are measured and evaluated to the extent feasible, incorporating results from studies published elsewhere.

The gradual changes in demand that evolve as part of economic development are considered first. In the early stages of economic development, characterized primarily by a noncommercial, agriculturally oriented economy, ecological factors have an important role in determining the pattern of food consumption. Consequently, one or two main foods tend to become the staple items in the diet—such as rice in Japan, wheat in West Asia, potatoes in Ireland, and corn or beans in many Latin American countries.<sup>5</sup> But as the economy develops internally and becomes more commercially oriented,

diversification and improvement of the diet occur as a result of higher incomes and a more diversified food supply. Higher incomes may also lead to increased consumption of nonfood agricultural commodities, such as cotton.

In this developmental process, a shift from a cereal- or carbohydrate-based agriculture to a feed-livestock oriented agriculture generally evolves. The process may also include a shift within the cereals group, the nature of such a shift depending on the initial pattern of cereal consumption. In countries where rice has been a staple, shifts in consumption might tend toward wheat. With continued economic development in all countries, one could visualize the eventual evolution of a more homogenous worldwide consumption pattern. However, because the initial food patterns have deep cultural roots, some regional differences should continue, at least within the time horizon of the research project. For example, rice is expected to continue to be the basic food in Japan and East and Southeast Asia while having a minor role in Western Europe and the United States.

The degree and speed with which gradual shifts take place depend on the relative initial importance of the staple food in the diet, on the national food policy, and on the relative price structure for food commodities. Even though all three factors may be interrelated, basic underlying shifts may still occur despite unfavorable relative prices. These basic shifts are often considered to be a function of time in statistical measurement and associated with long-term growth in income.

The methodology of the measurement of demand was approached from three viewpoints: (1) intercountry comparisons for a point or points in time, (2) in-depth country analysis, and (3) commodity analysis at the world level.

<sup>5</sup>This sequence excludes nomadic peoples whose main source of food is of animal origin. But even here the principle of availability also applies.

Table 5.--Relative importance of agricultural exports in less developed countries, 1964-66 average

Exporting region				Selected commodities' share of total agricultural exports		
	Total exports	Agricultural		Cereals	Fibers	Fruits
	Value	Share				
				Million U.S. dollars		
Latin America	12,753	7,005	55	9.8	7.5	5.1
Central America and Mexico	4,235	1,875	44	4.1	15.5	10.3
South America	8,518	5,130	60	11.9	4.6	3.3
Africa and West Asia	14,598	4,068	28	3.4	21.9	7.1
East and West Africa	4,918	2,140	43	1.0	11.4	1.8
North Africa and West Asia	9,680	1,928	20	6.1	33.8	13.0
Asia	9,253	4,380	47	13.0	7.1	2.5
South	2,650	1,500	57	2.3	17.7	2.0
Southeast	978	780	80	60.5	0.6	0.1
East Asia and Pacific Islands	5,625	2,100	37	3.4	1.9	3.8
Total less developed	36,604	15,453	42	9.0	11.2	4.9
				Selected commodities' share of total agricultural exports		
	Oilseeds	Coffee	Cocoa	Tea	Vegetables	
				Percent		
Latin America	0.4	22.5	1.2	0.1	0.3	
Central America and Mexico	0.9	21.2	1.1	0.0	0.7	
South America	0.2	23.0	1.2	0.2	0.2	
Africa and West Asia	9.2	14.5	9.7	1.5	2.2	
East and West Africa	14.9	27.5	18.4	2.7	0.9	
North Africa and West Asia	3.0	0.0	0.0	0.1	3.7	
Asia	6.2	2.1	0.2	11.5	0.9	
South	1.0	1.7	0.1	31.7	0.6	
Southeast	1.5	0.0	0.0	0.2	2.2	
East Asia and Pacific Islands	11.6	3.3	0.4	1.2	0.5	
Total less developed	4.4	14.6	3.1	3.7	1.0	

Source: (24), (62), and (63)

## Intercountry Comparisons

One of the major problems of statistical measurement of evolutionary changes in demand is the lack of a suitable data series of sufficient length to reflect structural changes. An alternative is to make intercountry comparisons: This method is valid provided that: (1) some worldwide consumption function exists and is related to economic development, (2) the consumption levels and patterns in different countries at any point in time represent different stages in the development process, and (3) variation in consumption between countries not accounted for by the main sequence of events can be accounted for or ignored.

### Grain-Livestock Economy

In several of the studies, intercountry comparisons were made in which the evolutionary process was assumed to exist and to be related to economic development. One of these studies (55) dealt with the main sequence of events in the development of a world grain-livestock economy. By means of regression analyses, three basic world functions were generated: a consumption function for meat; a function for grain used as food; and a function for determining the grain-meat ratios for countries at different stages of economic development. A world consumption function for grain fed to livestock was then derived by utilizing the functions for grain-meat ratios and the demand for meat under assumed levels of self-sufficiency in meat production in all countries.

The results of this analysis supported the hypothesis that a world demand function exists for meat, since over 80 percent of the variation in meat consumption between countries was explained by the world demand function. This analysis indicated that the price elasticity of demand for meat was -0.6, while the income elasticity of demand for meat was 0.65. Both elasticities were evaluated at the mean values of the variable and are consistent with values obtained from time series data in selected countries.

The analysis of the grain-meat ratio (input of grain per unit output of meat) indicated that more grain per unit of meat output is used in the developed area than in the less developed area. Because the grain-meat ratio is low in the LDC's, the important variant in grain use may be changes in the grain-meat ratio. On the other hand, income as it affects meat consumption is the chief variant in the use of grains in the developed countries. The sequence of the study also suggests that the grain-meat ratio varies directly with meat consumption.

In the same study, the direct consumption of

grain for food was systematically related to economic development as measured by per capita income. The developed regions responded negatively to income and the LDC's responded positively. In contrast, income-consumption relationships for meat, though varying, remained positive for all regions in the world demand function.

### Bananas

Intercountry comparisons were also used in estimating a world consumption function for bananas. This study (44) dealt primarily with consumption in importing and nonproducing countries, where bananas are consumed as fruit rather than as a staple food and the levels of consumption are more closely related to the actual level of consumer expenditures than in producing countries. Regression analyses were used to generate a world consumption function under the hypothesis that an approximate saturation level of consumption exists and that the income elasticity of demand declines as countries pass through the various stages of economic growth and development.

The results of this analysis lent support to the hypothesis that a world demand function exists for bananas in importing countries, since more than 70 percent of the variation in banana consumption between importing countries was explained by the world demand function. This analysis also indicates that the average price elasticity of demand for bananas was -0.79 when evaluated at the mean for all countries.<sup>6</sup> The implied income elasticity for given levels of consumer expenditures per capita in 1964-66 ranged downward from a high of 2.10 at \$200 per capita, to 0.7 at \$600, 0.42 at \$1,000, and 0.21 at \$2,000 expenditure per capita.

The changes in per capita banana consumption are very similar in the rapidly growing countries that had total per capita expenditures averaging between \$600 and \$800 in 1964-66. These relationships are similar even though import restrictions, tastes, and consumption habits differ considerably in countries like Japan, Italy, and Ireland. In the more industrialized and highly developed countries, per capita consumption tends to level off as it approaches the apparent saturation level of 10 kilograms. There is some evidence that per capita consumption might decline at very high levels of per capita income, as in the United States, thereby suggesting that bananas might become an inferior good for very-high-income consumers.

<sup>6</sup>For the U.S., Houck (32) reported a higher elasticity of 1.93. FAO (31) reported higher elasticities for the U.S. (1.85), for West Germany (1.33), and for Canada (1.40). These estimated elasticities may be too high for prediction purposes, especially as the saturation level of consumption is approached by 1980.

## Fibers

As income levels increase, demand for fibers for clothing and household use can also be expected to increase. Cross-sectional and time series analyses were conducted to measure the effect of changes in income levels and fiber price on per capita fiber use and cotton's share of fiber use (45). Cross-sectional analyses of 33 regions covering the world revealed income elasticities of 0.62 to 0.65. Results from time series analyses for individual regions relating fiber use to time, income, and price of cotton and synthetic fibers were inconclusive.<sup>7</sup> But simple analysis of the effect of income on fiber use showed that income elasticities of demand for most developed regions are higher than previously assumed. The income elasticities encountered for most regions ranged between 0.6 and 1.1, and displayed no tendency to drop among regions with successively higher per capita incomes. The income elasticity for the developed sector was 0.73, compared with 0.62 for the world.

Interregional comparisons of per capita income and cotton's share of fiber use indicate that cotton's share tends to decline as per capita income increases. However, the influence of income on cotton's share either diminishes to nothing or is overridden by other factors after a country reaches a certain level of development. The results of time series analyses designed to measure the impact of changes in cotton or polyester (synthetic) prices on cotton's share were somewhat inconclusive, but did indicate that increases in polyester price or decreases in cotton price favorably affect cotton's share of fiber use.

### Country Analysis

Paralleling the intercountry comparisons, demand analysis also included making indepth country studies, which made use of a number of country studies relating to long-term supply and demand projections of selected agricultural commodities.<sup>8</sup> In addition, certain countries were singled out as important markets for agricultural imports for further study.

### Grain-Livestock

Japan.—Several studies were conducted on Japan to explore the nature of this important market. The first study, by Barse (2), was concerned with effects of different food strategies on the development of food consumption patterns in Japan,

with particular emphasis on changes since the mid-1950's. This study found that although Japan was experiencing a very rapid growth in consumer income, food consumption per person was lower than for any comparably developed country. Consumption was lower because of limited production potential in agriculture and trade restrictions on processed food imports. Consumption of livestock products was especially low, because animal agriculture was developing from a low level of resource use.

To indicate the influence of food strategy on consumption patterns in Japan over the next 15 years, Barse developed three alternatives. The alternatives were called: (1) a Western food strategy, (2) a Pacific food strategy, and (3) an Eastern food strategy. Each strategy was discussed in terms of domestic and import requirements of food. As the name implies, the Eastern food strategy would continue the present consumption patterns and limit imports. The Western food strategy, on the other extreme, would project a western diet and imply a very high level of imports. For example, imports of feed grains in the 1980's would range from 12.4 million tons under the Eastern Food strategy to 40.8 under the Western food strategy. The more likely result is probably somewhere in between. Because massive food imports entail special risks, it should not be surprising if Japan were to follow a policy to reduce the dependency on a single source of supply, thus encouraging Southeast Asia and East Africa as suppliers of feed grains for Japan.

A second study (21, 22) was an econometric investigation of the Japanese grain-livestock economy. The investigation consisted of two phases: (1) statistical analysis of historical relationships, and (2) development of a more complete projection model. The regression results indicated a high interdependence between and within the supplies and demands for livestock products. Results indicated a growing demand for beef, pork, and chicken. In particular, the excess demand was reflected in rising prices of beef, indicating beef to be the favored meat. The demand for beef and pork was quite responsive to price (greater than unity), implying that the demand for grain for feed was also quite responsive to price. Japan's import policies with respect to meats continue to be restrictive so that the Japanese livestock sector can become competitive. Because of this, and since expansion possibilities of coarse grain production in Japan are limited, the price responsiveness is reflected in imports of corn and other feed grains. Rising domestic livestock prices relative to world prices would indicate that grain imports were also curtailed but not to the same extent as imports of primary meats. Thus, the effective response of imports to changes in world prices is smaller than if the above restrictive practices were not in effect.

<sup>7</sup>An earlier USDA study (14) found the world price elasticity of demand for cotton alone to be -0.25 for the 1948-62 period.

<sup>8</sup>These studies were conducted under contract with the USDA as part of a series to evaluate long-term supply and demand prospects for agricultural products throughout the world. They are marked with an asterisk in the references at the end of the report.

Another study used the Japanese market to measure shifts in food consumption arising from changes in relative price structure (56). The price of rice may not have an important effect on consumption in other developed regions, but in rice-consuming countries it would be expected to be an important determinant because of its impact on consumers' buying power (income effect). Thus, relative prices, as well as underlying trends, would be expected to affect jointly the consumption of rice and wheat in Japan. To test the hypothesis, several regressions were run using data for Japan for the period 1957-67.

The results of these regression analyses indicate that relative prices did influence the consumption mix of wheat and rice. There was a shift in price policy, which resulted in rice becoming more expensive than wheat during the latter part of the period. Because of this shift in policy, it was possible to obtain some good price cross effects reflecting strong substitution of wheat for rice. The results also indicate that the income effect for rice was negligible, while that for wheat was significantly positive.

The findings for Japan are significant because they may indicate forthcoming consumption shifts in rice-consuming, less developed countries that are beginning to start to climb up the economic ladder. In Taiwan and the Philippines, for instance, the effects of the substitution of wheat for rice are visible even though not statistically measurable because the shifts are not yet fully established. Likewise, attempts to measure statistically the substitution effect via prices for time series data for India and Pakistan have been disappointing. A substantial shift probably has taken place, with imported Public Law 480 wheat from the United States<sup>9</sup> replacing rice in most years, especially the 2 drought years of 1965 and 1966.

Other countries.—The United States, Canada, and Western Europe are major users of grain for feed. For these countries, demand relationships from several published studies were incorporated into the projections model for grain. Ahalt and Egbert (4), in a study of the United States, related feed grain consumption to livestock production units, livestock prices, and feed grain prices. They found that the demand price elasticity with respect to feed grain prices was -0.3. Regier (54), in a study of the EC, found the demand price elasticity to be somewhat higher than that for the United States. Bjarnason (10), in a more recent study of several countries, found similar results. He estimated the demand

elasticities for the United States, Canada, and France, all major grain producers, to be in the order of -0.45, -0.59, and -0.50, respectively. For Argentina and South Africa, producers that use relatively little grain for livestock feeding, the demand price elasticity was about -0.25, a much lower figure. In contrast, the price elasticities of demand for feed grain in the United Kingdom and Japan were found to be about -1.0.

#### Oilseeds

Most oilseeds yield vegetable oil and oilcake in relatively fixed proportions. Vegetable oil is largely used for food or industrial products and oilmeal is a feed—mainly a protein supplement. Because the markets for the two products are largely independent, they were analyzed separately.

**Oilcake.**—The major consumers of oilcakes are the United States, Canada, Japan, and the countries of Western Europe. In these countries, the demand for oilcake is related to the demand for feed grains since they are inputs to the same enterprise—the livestock industry. In some areas, the relationship between feed grains and oilcake is predominantly complementary, while in other areas it might be competitive. To test the demand interrelationships between feed grains and oilcake, a simplified two-stage least squares model was run for the developed countries. Results from the analysis of the EC indicated that the relationships between feed grains and oilseeds were competitive because of the high price of grains relative to oilcake. But in the United States, Canada, and Japan, the results indicated that a complementary relationship existed. In fact, the price of feed grains was not only negatively related to use of oilseeds but it appeared to have more influence than the price of meal in determining the level of oilcake use. But more meaningful results were obtained in multi-equation models which took into account the complex interrelationships of the oilseeds economy. For example, in a study of the United States, Houck (33) estimated a price demand elasticity of -0.33 for soybean meal, compared with the -0.28 estimated by Vandenborre in another study (65).

**Vegetable oils.**—Separate regressions were run for 18 regions to determine the effect of oil prices, substitute prices, and income on consumption of oil. The consumption response to income was statistically measurable, and indicated that income response was higher in the less developed regions than in the developed regions. In seven of the less developed regions, statistically significant income elasticities ranged from 0.7 to 2.3.

<sup>9</sup>For most part, U.S. food aid is exported under Public Law 480—The Agricultural Trade Development and Assistance Act.

In contrast, the income elasticities for Canada, the EC, and Japan ranged from 0.4 to 0.7. For Australia and the United States, high income elasticities were obtained but these coefficients included a trend factor that reflected the shift from animal fats to vegetable oils. The income coefficients for the United Kingdom and Other Western Europe were not statistically significant. While many of the coefficients relating to direct and cross price elasticities were not statistically significant, there was evidence to support the expected low negative response to changes in own price and positive response to substitute prices. In the Houck and Vandenborre studies mentioned previously, the demand price elasticities for soybean oil were -0.51 and -0.45, respectively.

#### Beverage Crops

Separate multiple regressions analyses were conducted for the principal importing countries to determine the effect of changes in own price, income and prices of substitutes on consumption of coffee, tea, and cocoa (60).

**Coffee.**—The results of the analyses on coffee indicated that changes in taste in the United Kingdom, and Canada, (and probably Australia and New Zealand) were perhaps more important than changes in real price or income in explaining the rather evident substitution of coffee for tea in total beverage consumption per capita. Per capita consumption of coffee has been rising while consumption of tea has tended to remain constant or has declined.

On the other hand, technological factors were of major importance in explaining changes in the United States, where per capita utilization of coffee beans has declined in recent years. But when the actual cup yield per pound of coffee was considered (39 in 1949 and 54.4 in 1965) in the analyses, the results indicated that per capita consumption has tended to increase slightly or remain constant. Results of these analyses indicate a very inelastic demand for coffee in the United States (-0.1 for coffee price, -0.07 for tea price, and 0.1 to 0.2 for income).

The elasticities for the EC, which were higher than those for the United States, indicate that

increased coffee consumption per capita has responded to changes in real prices and consumer expenditures, as well as to changes in tastes. The direct price elasticities ranged from -0.3 in Italy and France to -1.6 in West Germany, the latter elasticity reflecting the impact of high consumer taxes at the retail level. The cross-price elasticities for tea and cocoa ranged from 0.3 to 1.4, reflecting a strong substitution effect under existing price structures. The positive response of coffee consumption to rising income is indicated by range in income elasticities: 0.2 to 1.3. Similar patterns were evident in the "Other Western European" countries, except in the Scandinavian countries, where consumption levels were high; therefore, the direct and substitution price effects were significantly lower.

**Tea.**—In the United Kingdom, the world's largest tea consumer, an apparent trend to substitute coffee for tea is indicated by the negative income elasticities—ranging from -0.9 to -1.1—and the high cross elasticity of 1.1 for coffee price.

Per capita consumption of tea in the United States and the EC was positively related to changes in consumer income (.6 for the United States and greater than 1.0 in the EC). The direct price elasticities were low in the United States but were generally higher in the EC, where they ranged from -1.0 to -2.0. The cross elasticity for coffee price was generally low in the United States and in the EC, except in Italy (1.6). The cross elasticity for cocoa price was also low in both the United States and four of the EC countries but was significantly higher in the Netherlands (2.0) and West Germany (1.1).

**Cocoa.**—Results from analyses for cocoa tend to indicate a very slight substitution of coffee and tea for cocoa in all countries except in the EC, especially Italy. In the EC, the cross-price elasticity of tea for cocoa was also low. However, with regard to coffee for cocoa, it was generally higher—in Italy, much higher (1.3). The results for most countries indicate that cocoa consumption was positively related to changes in real consumer expenditures and that changes in real prices would increase cocoa consumption except in the United Kingdom, where consumption is negatively correlated with income. In general, the results for cocoa were not as conclusive as for coffee and tea in isolating the major factors affecting per capita consumption.

## IV.—TRADE POLICIES

A realistic evaluation of import demand for agricultural products must take into account the restrictions to the trade flows of these commodities. In the previous chapter, the effect of factors such as incomes and prices on demand were analyzed. But trade may be a necessary source of supply to fulfill

this demand. Projections of trade that are made within a supply-demand framework must also consider the influence of trade policies.

A common objective of most commodity trade policies throughout the world is price stabilization.

Most often the effort is directed to producer prices, but for some importing countries, policies may be geared to consumer prices as well. Policies can be either trade restrictive or trade stimulative. Implementation of trade policies takes on many forms—tariffs, levies, quotas, embargoes, standards and grades, subsidies, and concessions on terms of trade. In addition there are several International Commodity Agreements, including ones on wheat (grains), coffee, and sugar.

### Agricultural Import Barriers

This chapter draws on project research on trade policies of the developed areas, primarily (8).<sup>10</sup> It is basically descriptive and does not assess the effects of trade barriers. But the effect of these barriers is taken into account in the mathematical projections model discussed in chapter V. The barriers are discussed by commodity and country, and, in some cases, their importance or "height" is evaluated with respect to world prices. In other cases, the size of certain import quotas is evaluated with respect to a country's population.

The mere presence of import quotas, of even a very large size, is inherently trade-restricting because trade could be contracted quickly if the quotas were suddenly made smaller by administrative action. Nevertheless, it is useful to know the size of import quotas so that country comparisons can be made. But, to make these comparisons more meaningful, country quotas can be adjusted to reflect differences in country size as measured, for example, by population, crop production, or per capita income. In this chapter, the concept of an import quota per capita is used.

The "height" of a trade barrier may be defined as the quota in quantity per capita, the ad valorem rate of a tariff, or the ad valorem equivalent rate of a specific duty. All specific duties are stated in dollars per ton at par value exchange rates of 1969.

In stating the size of a quota that is an embargo, the term "no quota" is avoided because it is not clear whether the term means "no quantitative restriction" or "import embargo."

"State trading," or a governmental import monopoly, may encompass the concepts of both tariff and quota, as well as normal marketing functions such as purchase, storage, transport, and

<sup>10</sup> Surveyed in this section are the United States, the EC, Japan, the United Kingdom, Denmark, Finland, Ireland, Norway, Sweden, Switzerland, Austria, Portugal, Spain, Greece, Canada, Australia, New Zealand, the Republic of South Africa, and the USSR. The time period is the late sixties.

sale. The government import plan for a commodity becomes, in effect, a quantitative restriction or a quota, since import purchase decisions are exclusively in government hands. Though government import plans are frequently revised as a year progresses they may be viewed as a *de facto* annual quota.

State trading implies that a government monopoly takes title to shipments of the imported commodity at the point of importation. Taking title and reselling by the monopoly may be almost instantaneous, or the monopoly may retain title to the imported goods and store them for many months. Moreover, the commodities may also be transported at government expense while under monopoly ownership. As a result, at the time the government monopoly sells to wholesalers on the domestic market, it may be difficult to determine how much of the "price markup" is attributable to storage, transport, and normal marketing functions, and how much to a partly concealed import tax. Such a tax, or "skimming," is analogous to a specific tariff or other tax paid on importation, and can be converted to an ad valorem equivalent tariff levied upon the c.i.f. price at which the monopoly took title to the commodity.

From the standpoint of policies, the countries of the European Community are considered as a regional aggregate. The Common External Tariff and the Common Agricultural Policy of the EC, even though imperfectly implemented, justify coverage in this manner. However, there are exceptions since some EC countries are allowed to have national import policies dealing with particular commodities. These national policies may differ from the Common Agricultural Policy. For example, Italy is the only EC country with an embargo on citrus imports.

### Wheat

Of the 19 countries surveyed (18 plus the EC as a whole), 14 maintained quantitative restrictions on wheat imports in the form of tonnage quotas, state trading, or various embargoes all of which can be stated as *de facto* import tonnage quotas. Only the EC, the United Kingdom, and Sweden clearly did not maintain these types of quantitative restrictions. In some years, Switzerland has used a milling mixture regulation to impose a *de facto* import quota for food wheat, and a direct quota on total feedstuffs to restrict imports of feed wheat.

In 1969, the variable levy on wheat in the EC was equivalent to an annual average of an 83-percent tariff, or almost as high as the Swedish tariff equivalent of 86 percent. The United Kingdom's deficiency payment system in practice is a substitute for a high protective tariff. Most of the direct payment to farmers per ton of wheat insulates them

from world market prices. This per unit payment to farmers is large enough to enable British wholesalers offering U.K. wheat to undercut "world" prices (c.i.f. plus inland transport and storage) of comparable imported wheats. Normally, this can be done even without the small variable levy on wheat imports imposed from time to time.

International trade in wheat has been subject to special trading agreements almost continuously since 1949. The first International Wheat Agreement (IWA) was effected on August 1, 1949 and its successor, the International Grains Arrangement (IGA) became effective on July 1, 1968 for a duration of 3 years. The IGA consists of two legal instruments—a Wheat Trade Convention and a Food Aid Convention.<sup>11</sup> The Wheat Trade Convention, which is a stabilizing instrument, prescribes a price range for international trade. The Food Aid Convention commits participating countries to contribute wheat, coarse grains, or the cash equivalent as aid to less developed countries to an amount of 4.5 million tons annually.

International commodity agreements have met with varying degrees of success and the IGA and its predecessor are no exceptions.<sup>12</sup> Already the price levels of the IGA have failed to hold up under the current world supply and demand situation and are well below the established minimums.

#### Rice

Of the countries surveyed for this project, nine (including the USSR) employed quotas as the main device for restricting rice imports, while eight (the United States, EC, the United Kingdom, Denmark, Switzerland, Austria, Canada, and Australia) had a tariff on rice imports. Only two countries, Sweden and New Zealand, had no restrictions on rice imports.

All the specific tariffs for the 17 countries with restrictions were converted to ad valorem equivalents under specified c.i.f. price assumptions and arrayed with the conventional ad valorem duties. The tariff rates then ranged from a high of 36 percent in the EC to a low of 5 percent in Denmark and the United Kingdom. Preferential tariffs for rice by country of origin are used in the United Kingdom and Australia, while preferential quotas by country of origin are employed by Greece, Japan, and Portugal.

#### Coarse Grains

Quantitative restrictions on barley, corn, and grain sorghums are almost as widespread as those on

wheat. They are most frequent in developed countries, not just in the traditional grain-exporting countries, but also in importing nations desiring to protect domestic producers from world competition. For example, in 1969, Spain reimposed severe quotas—embargoes—on imports of corn and grain sorghum after several quota-free years.

Rates of ad valorem duty or tariff equivalents on feed grains range from highs of about 123 percent on corn and barley at Swedish ports to a low of about 2 percent in the United Kingdom (variable levy). However, this low tariff equivalent of the U.K. levy is deceptive because it must be read in conjunction with the price-preference effects of the U.K. deficiency payment system.

Japan employs a complex tariff quota on corn and sorghums for nonfeed industrial use, and generalizing about Japanese feed grain import barriers is thus more difficult. Import barriers of different heights according to different end use of a standard commodity are, in a way, analogous to the different barrier heights maintained according to country origin of a commodity. Australia and Portugal, and the Republic of South Africa when it imports feed grains, conclude state purchases on the basis of clear geographical preference.

#### Oilseeds

For peanuts and soybeans, nine of the surveyed countries imposed quotas on imports of peanuts and/or soybeans; for cottonseed, five countries did. In addition, over one-half of the countries applied tariffs on the imports of at least one of these three oilseeds. Ireland, Norway, Austria, and Canada were the only countries without trade barriers on these oilseeds.

Trade restrictions were fewer and less severe on copra and palm kernels than on peanuts, soybeans, and cottonseed. Only four of the surveyed countries employed quotas on imports of copra and palm kernels; eight invoked tariffs on these commodities. Seven countries had no restrictions at all.

In general in the surveyed countries, trade barriers on vegetable oil imports were more prevalent and restrictive than those on oilseed imports. Five nations used quotas to restrict imports, but tariffs and specific duties were the main restrictions. Preferential arrangements were also commonly employed.

#### Cotton

Generally, import restrictions on cotton lint (fibers) by nonproducing countries or those

<sup>11</sup>For a fuller discussion of the IGA see (34).

<sup>12</sup>For a discussion on International Commodity Arrangements and Policies see (12).

producing only a small part of their requirements are minor. However, trade preferences are afforded by some countries. For example, the Latin America Free Trade Area (LAFTA) importers give preferences to exporting members. Cotton-producing countries generally place restrictions on cotton lint imports, usually allowing entry only to those types not produced domestically.

The trade restrictions on cotton textile imports include tariffs, taxes, quotas, licensing, and other restrictive arrangements. Tariffs in the developed countries surveyed ranged from 5 to 25 percent ad valorem. Australia was the notable exception, with duties ranging from 30 to 60 percent. Trade preferences or concessions are given by countries and regions such as the United Kingdom to the Commonwealth members, and the EC to associate members and the Associated Overseas Countries (AOC). Also, there is a long-term agreement on cotton textiles which is a multilateral agreement under the General Agreement on Tariffs and Trade (GATT). It is intended to regulate the growth of cotton textile exports from the LDC's to the developed importers.

#### Bananas

World trade in bananas is not regulated by any formal world commodity agreement. There are, however, policies in individual countries that do restrict imports and affect consumer prices. These policies involve the setting of quotas, tariffs, and internal taxes on consumption. All of these restrictions generally have the effect of raising retail prices of bananas and thus reducing consumption. Quotas and discriminatory tariffs have similar effects by influencing the direction of trade and in lowering the level of demand through higher prices than would prevail under free trade. The internal tax has the effect of raising retail prices or reducing actual consumption below what would prevail in the absence of the tax.

There are no restrictions on banana imports and consumption in the United States, Austria, Denmark, or Sweden. Limited restrictions prevail in Canada, Ireland, and the Republic of South Africa. Varying degrees of restrictions exist in the other major markets, ranging from an almost-complete embargo in Spain and quota limitations in Italy, Finland, and New Zealand, to no quotas but preferential tariffs for certain producing countries in other major markets. Discriminatory tariffs exist in the United Kingdom, Australia, New Zealand, Portugal, Switzerland, and the EC. With the adoption of the Common External Tariff by the EC in 1968, all member countries adjusted their rates to the French ad valorem rate of

20 percent for all third countries. The effective rate for West Germany, however, has not actually resulted in a 20-percent duty, primarily because of a special protocol of the Rome Treaty that provided for the setting of an annual duty-free quota.

#### Coffee, Tea, and Cocoa Beans

Coffee exports are regulated by a worldwide commodity agreement—the International Coffee Agreement (ICA). All annual export quotas under the Agreement should be viewed as a total global annual import quota. The ICA is in effect a quantitative restriction on total coffee imports, and hence a formal trade barrier. For example, the total world basic quota under the 1968 coffee agreement was 3,302,000 tons. This quota may be viewed as the approximate ceiling on coffee exports and imports, since about 95-99 percent of world trade in coffee takes place under terms of the ICA and the ICA is subscribed to by most coffee exporting and importing countries.

Of the 19 developed countries surveyed, only six maintained conventional quantitative restrictions on some or all of a country's raw coffee imports. These were state trading or import quotas. Nine of the 19 countries employed only tariff or tax barriers. Only four countries—the United States, Ireland, Norway, and Canada—had no trade barriers on raw coffee imports. In nine other countries, ad valorem or equivalent tariff rates for 1968 ranged from a high of about 100 percent in Greece to a low of about 1 percent in the United Kingdom.

In general, fewer countries had import barriers against tea and cocoa beans than against coffee; of the surveyed countries, 11 had none against tea, while 12 had no barriers against cocoa.

Only three countries maintained quotas on tea—the USSR (in the form of state trading), Japan, and Ireland (import monopoly). Three ad valorem tariffs in other nations were 9, 20, and 35 percent, although specific duties in Germany, Austria, and Portugal were over 100 percent ad valorem equivalent. The Greek duty was about 200 percent equivalent.

There were no import quotas recorded against cocoa, except state trading in the USSR. The ad valorem tariff for cocoa in the EC from third countries was about 5 percent, and in Spain two tariffs together were almost 40 percent. Of the specific duties or taxes levied against cocoa, the Italian tax of \$400 per ton was the highest—almost a 100-percent ad valorem equivalent.

## V.—FRAMEWORK FOR PROJECTIONS TO 1980

Estimates of export earnings or import costs for selected agricultural commodities were made under three basic economic projection sets, each within a basic supply-demand framework. Projection set I assumes a continuation of present food and fiber policies in the less developed countries, allowing for moderate gains in productivity consistent with some improvements in available technology. Under sets II and III, respectively, higher and lower rates of agricultural productivity and economic growth in the less developed countries would prevail than under set I. Major emphasis is placed on projection sets I and II since they are more consistent with current national goals and development plans that are designed to accelerate economic growth. Set III is designed to illustrate the effect of adverse economic conditions or shortfalls in national development objectives of the LDC's on their export earnings potentials. The rates of economic growth and agricultural productivity in the developed and central plan countries remain the same in all three alternatives. Likewise, present food and fiber policies in these two areas are assumed to continue with little modification. However, for commodities where major exporters are in the developed area, the effect of changing policies in those countries on trade were considered. Further, several additional variants were included for grains because of their importance in the world food picture.

### Analytical Model

The two key variables used to estimate the export earnings (or import costs) are the quantities and prices at which products were shipped.<sup>13</sup> These were projected within a basic supply-demand framework that assumed interdependency within and among regions. Specifically, for each projection set, production, consumption, trade, and price levels were determined regionally for each commodity.

A formal econometric framework was developed for making a set of projections that would be internally and externally consistent with assumed economic conditions. More specifically, the formal framework was designed to: (1) determine the equilibrium quantities and prices in 1980 for selected commodities and countries or regions, taking into account exogenous variables such as population, income, technology, and tastes; (2) determine trade flows between countries or regions consistent with an objective function that minimizes transfer costs; and

(3) provide sufficient flexibility to incorporate institutional constraints or limitations on consumption and trade flows in the selected commodities.

Two models were developed within this econometric framework. Model I consisted essentially of a set of simultaneous solution equations, and model II incorporated this set of simultaneous equations into a larger linear programming framework.

Model I consists of a set of supply and demand equations for each commodity in each country or region and sets of price relationships linking commodities within and between regions. Prices were used to relate the behavior of each supply and demand equation within and between regions. Although prices play an important role in the model, other variables and relationships are used to take institutional factors into account. The output of model I is a set of equilibrium quantities and prices of the commodities by regions for some level of exogenous variables such as population and income. Because model I provides no information on trade flows, it is less costly to use than model II and is preferable for testing the sensitivities of coefficients in the model and program evaluation where information on trade flows is not required.

In model II, an objective function based on transfer costs and a transportation matrix were added. In addition to determining equilibrium quantities and prices, this model allocates the trade flows between regions consistent with minimum transfer costs and institutional constraints. This model no longer depends on a square matrix; hence it allows the incorporation of additional and more refined constraints, and becomes a more flexible tool to evaluate the effect of institutional and policy limitations.

One of the advantages of a mathematical model is that it permits measurement of the total effect of a change in a single variable or parameter on any other variable in the system. However, no formal mathematical model completely describes the real world. Such a description requires much more than a set of standard supply and demand equations linked by prices with respect to commodities and regions. A useful formal model should be capable of handling mathematically any number of institutional and policy constraints, such as special trading arrangements, quotas, export subsidies and taxes, variable levies, food aid programs, storage capacity and policies, price support programs, and quality differentials within commodities. The basic model in this study was designed to provide this flexibility.

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<sup>13</sup>Prices are generally in terms of f.o.b. for exports and c.i.f. for imports.

The extent to which the formal mathematical model was used varied among commodities. For grains, the model was fully specified and programmed for a 360 IBM computer. The model synthesized a set of mathematical equations consistent with economic theory and statistical findings to the extent possible. Because of the model's size, it was not feasible to estimate all the coefficients in the model by a direct statistical fit.

In the other commodities, economic models were developed but were not fully programmed to determine simultaneously equilibrium prices and quantities. For example, investigations disclosed that 29 relations were necessary to explain fully the interdependency between one importing country and one exporting country producing one oilseed, each converted into an oil product and an oilcake product. While it was not possible to determine statistically all these relationships, knowledge of the total system led to better choice of variables in the limited relations that could be fitted and projected in the oilseeds economy. Thus, in some commodities, special statistical relationships were developed to project key segments of demand, but final estimates of supply and demand were reconciled through an informal iterative process. Time and information permitting, the formal computerized model is capable of being extended to such commodities.

### General Assumptions

The projection sets in this project were based on certain assumptions. A preliminary set of production, consumption, and trade projections were made using base year prices to tentatively determine potential surplus and deficit areas and the types of adjustment needed in the model to yield equilibrium conditions. The possible variations in factors, such as population and income, affecting the growth in consumption and demand for selected agricultural products were held to a minimum.

As is usual, the projections imply the absence of major wars and natural disasters that would substantially change the future prospects.

The reader, at this point, should be cautioned that projections and not forecasts of the future were made. Specifically, the probability that a particular set of projections would materialize depends on the likelihood of the assumptions and the relationships used in making the forecasts. Moreover, long-range projections may be invalidated if they call attention to developing disequilibria that are followed by corrective action.

### Population

Population is a key variant in the growth in demand. Thus, assumptions regarding population growth are of the utmost importance. Original research on population growth, however, was not within the scope of the project. Consequently, population growth rates that were used were based, with some modifications, on the population projections of the Population Division of the United Nations. This Division has been preparing projections for over 15 years. Its most recent study on the world population was published in 1966 and the projections contained in this report have been widely used (61). Some adjustments to the UN projections were made based on studies that have been conducted by the UN's Food and Agricultural Organization (FAO) and by the Organization of Economic Cooperation and Development (OECD), and long-term supply and demand studies of the USDA, cited on page 9.

For the project, a single population projection was selected for each country. The regional population projections that were used in various commodity demand analyses are presented in table 6. It was not deemed necessary to develop both high and low population projections, reflecting different fertility rates, because any changes in these rates by family planning programs enacted now would have minimal effects by 1980.

### Income Growth

Income is another key variant in growth in demand for agricultural products. With given levels of population, prices, and other factors, the rate of increase in income largely determines the pattern and level of per capita consumption. While population may be the most important factor in demand growth in the LDC's, income is the most important contributor in countries like Japan, where population growth is less than 1 percent and income growth over 8 percent.

The projected rates of growth in national income selected for use in the research are presented in table 7. As with population, original research on the economic growth prospects of the countries of the world was not within the scope of this project. The projected growth rates selected therefore, were obtained through a careful review of studies in this area. Besides the trends in the historical time series data on national accounts, the main sources guiding the selection of final growth rates were reports by FAO (25, 27, 28, 29, 30,) OECD (53), and the USDA series of supply and demand studies on foreign countries.

Table 6.--Total world population, 1965, and projections to 1980

Region.	1965	1980	Projected annual rate of growth
	<u>Thousands</u>		<u>Percent</u>
Developed countries:			
United States	194,572	235,200	1.3
Canada	19,604	26,024	1.9
EC	181,594	198,385	.6
United Kingdom	54,595	60,690	.7
Other Western Europe	87,684	97,489	.7
Japan	97,960	111,563	.8
Australia and N. Zealand	14,000	18,216	1.8
South Africa, Rep.	17,867	26,000	2.6
Total developed	667,876	773,567	1.0
Central plan:			
Eastern Europe	121,430	138,763	.9
USSR	230,600	277,325	1.3
Communist Asia	795,604	1,077,064	2.0
Total central plan	1,147,634	1,493,152	1.8
Less developed:			
Mexico, Central America, and Caribbean	80,078	128,508	3.2
South America	166,046	247,185	2.7
East and West Africa	217,454	315,620	2.5
N. Africa and W. Asia	162,483	254,032	3.0
South Asia	638,064	913,655	2.4
Southeast Asia	81,057	117,969	2.5
E. Asia and Pac. Is.	198,597	298,920	2.8
Total less developed	1,543,779	2,275,889	2.6
World total	3,359,289	4,542,608	2.0

Source: Summarized from a working paper (49) prepared for this study on World Population and Income by Countries 1950-65 and Projections to 1980.

Table 7.--National incomes, 1965, and projections to 1980 under projection sets I, II, and III <sup>1/</sup>

Region	1965	1980			Projected annual rate of growth		
		Proj. set I	Proj. set II	Proj. set III	Total	Per capita	
Million dollars							
Developed countries:							
United States	397,800	730,287	SAME AS PROJ. SET I	4.1	SAME AS PROJ. SET I	2.7	SAME AS PROJ. SET I
Canada	27,142	50,551		4.2		2.3	
EC	146,351	274,955		4.3		3.7	
United Kingdom	53,917	85,202		3.1		2.4	
Other Western Europe	48,808	92,635		4.4		3.7	
Japan	34,887	110,667		8.0		7.2	
Australia and N. Zealand	14,317	25,883		4.0		2.2	
South Africa, Rep.	7,165	13,866		4.5		1.8	
Total developed	730,387	1,384,046		4.3		3.3	
Central plan:							
Eastern Europe	85,300	176,649		5.0		4.1	
USSR	219,700	499,852		5.7		4.4	
Communist Asia	85,600	158,669		4.2		2.2	
Total central plan	390,600	835,170		5.2		3.4	
Less developed:							
Mexico, Central America, and Caribbean	30,758	71,265	98,933	56,198	5.8	8.1	4.1
South America	63,270	123,159	160,043	102,425	4.5	6.4	2.5
East and West Africa	22,699	42,136	53,090	35,178	4.2	5.8	3.3
N. Africa and W. Asia	39,785	84,644	113,496	68,635	5.2	7.2	3.0
South Asia	64,059	119,180	151,363	99,802	4.2	5.9	3.7
Southeast Asia	8,427	16,042	20,775	13,321	4.4	6.2	2.1
East Asia and Pac. Is.	28,070	54,188	70,185	45,023	4.5	6.3	4.3
Total less developed	257,068	510,614	667,885	420,582	4.7	6.6	3.9

<sup>1/</sup> Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

Source: Summarized from a working paper (49) prepared for this study on World Population and Income by Countries, 1950-65 and Projections to 1980.

The same income projections were used in all projection sets for the developed and central plan countries. However, for the less developed countries three separate income projections were generated for projection sets I, II, and III that were consistent with the assumed growth in productivity. These projections recognized that in the less developed area, where agriculture accounts for a very large proportion of total economic activity, growth in agricultural output has a decided impact on growth of the overall economy.

The agricultural sector provides a large and growing market for nonagriculturally produced goods in the LDC's. It also provides many raw materials for industrial production and export. An acceleration of the rate of growth in agricultural production not only provides more food and fiber to people, but (a) increases the demand for industrial products, and (b) increases the supply of agricultural raw materials with which to increase industrial production and exports. An attempt was made in this project to relate growth in income in the agricultural sector to increases in the rate of growth of agricultural output. Such accelerated economic growth increases incomes and the demand for food.

If the rates of growth of agricultural output were to double over a given period of time, the rates of growth of total income and consumption would increase significantly. That is, per capita demand for food would change as per capita income rose. Thus, for a country that is a net importer of food, the absolute decline in imports resulting from increased domestic production would be less than the absolute increase in production.

A special study was made using data from 17 less developed countries to determine the relationship between growth in the agricultural sector and growth in total sector. The study indicated that after allowing for the shift in resources from the agricultural sector to the rest of the economy, the historical rates of growth in the agricultural and nonagricultural sectors were identical. In line with this conclusion, income growth was varied in the same proportion as growth in agricultural productivity in the less developed countries.

#### Specific Assumptions

A number of economic and policy conditions that directly affect supply and demand are applicable to major importers and exporters and therefore need to be specified and hold for all projection sets unless noted otherwise.

<sup>14</sup>See ch. 3, p. 9.

#### Policies of Major Importers

An important feature of the import and domestic food production policies of major developed importers is that they attempt to at least maintain current self-sufficiency ratios. Japan would be an exception, since she seems reconciled to some decline in her self-sufficiency ratio. For all other major developed importers, it is assumed that recent food and fiber policies will be continued. Some modifications were introduced where it appeared that a continuation of a particular policy would be untenable. These modifications, as well as the essentials of assumed food and fiber policies for each major importer, are indicated below.

Japan.—While the overall consumption patterns for most of the developed world have become relatively stabilized, Japan's future pattern of food consumption could evolve in different directions. For one thing, the manner in which Japan deals with its rapidly rising food demand without excessive increase in food prices will depend upon the type of food policy strategy she takes.<sup>14</sup> The pace and extent to which Japan evolves a more diversified pattern of consumption and a shift away from the traditional rice-based diet to more wheat and livestock products will be largely determined by policy decisions. And since increases in consumption of wheat, feed for livestock production, as well as other food and fibers must come from imports Japan's trade policy will directly affect her agricultural imports. It is assumed that food prices will be allowed to rise moderately. For example, retail prices of meats are assumed to rise about 1 percent a year.

European Community.—It is assumed that the essentials for the present Common Agricultural Policy will be maintained—that is, high internal prices, import restrictions, and export subsidies and preferential tariffs on tropical products—but with some modification and restructuring of agriculture because of the high cost of maintaining the CAP. This factor will lead to some freer access to the EC market.

United Kingdom.—It is assumed that U.K. membership in the Common Market will not have been achieved by 1980 and that a continued balance-of-payment problem will push the United Kingdom in the direction of increased cereal production and continued limitations on consumption of other food and fiber products to minimize imports. Thus, low prices to consumers but higher ones to producers will be maintained by deficiency payments to producers. Producer prices

for wheat may rise about 15 percent above current levels, while prices of meat will rise sufficiently to encourage feeding of feed grain in livestock production. Imports of agricultural products have not been specified. The prices of tropical products will be maintained near equilibrium levels to allow some growth in food and fiber consumption consistent with growth in consumer expenditures.

Other Western Europe.—Producer prices for wheat in southern countries will be lowered to encourage feed grain production. Current food and fiber policies will be maintained in the other countries.

#### Policies of Major Exporters

Two considerations are of utmost importance in the export policies of major exporters. The first is

to maintain stable prices at reasonable levels, and applies to projection sets I, II, and III. The second is to maintain a fair share of the market and applies to projection sets II-A and II-B. It is not always possible to achieve both of these objectives at the same time. During periods of heavy world supplies, prices cannot be maintained unless importers as well as exporters collaborate equally to curtail production.

While emphasis is on maintaining world price stability, it is assumed that moderate variation in prices will result when world supplies are in relatively short supply or in heavy surplus. It is further assumed that the major exporters will maintain a stock and production policy to maintain this relative price stability. Implementation of this policy would be achieved through increased international cooperation.

### VI.—PROJECTIONS OF DEMAND, SUPPLY, AND TRADE

The number of projection sets varied among the commodity studies. More alternative sets were tried for grain because the computerized projections model made this feasible. However, two basic sets were projected for all commodities. As indicated in the previous chapter, projection set I assumes the continuation of current policies. Projection set II determines whether an acceleration in the production growth of the less developed countries can lead to increased export earnings. Under this set, the annual growth rate in production in less developed countries is assumed to be increased by a factor of 1.4.

Because of the variations, discussion of the projection sets could take many forms. For consistency, projection set I is compared to the base period average, 1964-66. The other projection sets are compared to set I to test the effects of certain policy and economic variables on export earnings under alternative assumptions.

Because the research project focused on selected commodities, movements in production and consumption are treated on a commodity basis.

#### Projection Set I

##### Grains

The projections in set I affirm the conclusion of recent studies (3,52) concerned with the outlook of world supply and demand for grains over the next decade—grain supplies are expected to exceed demand at current price levels. It is recognized that price and policy adjustments will be needed to keep

exportable supplies in reasonable balance with import requirements.

For projection set I, the major developed exporters—the United States, Canada, and Australia—would adjust their supplies and export policies to maintain buoyant world grain trade prices. Consistent with this assumption, production of wheat in the United States, Canada, and Australia under projection set I increases only 8 million tons by 1980—a modest annual growth of 1 percent—as prices would come under downward pressures.

In contrast, with impetus from the "Green Revolution," wheat production in the less developed importing countries is expected to almost double by 1980 from the 1965 level of 39 million tons. This 1980 level means an annual increase of 4.4 percent (3.7 percent if base period production is adjusted for the effect of drought). The annual growth rate of wheat in Argentina is expected to be 1.5 percent (2.4 percent if adjusted for the unusual high level of production in 1966). The projected production increase in wheat for developed importers is 9 million tons, an annual growth rate of 1.3 percent.

The expected production pattern for rice is similar to that for wheat. The developed region has the capacity to expand production greatly, but a sluggish world import demand would cause the exporters to hold down production. Production in the United States, the major exporter in the developed world, would increase at an annual growth rate of 1.6 percent. Japan's production, accounting for close to three-fourths of the developed regions'

Table 8.--Wheat: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II 1/

Exporting region	1964-66	1980--proj. set I	1980--proj. set II
	Production	Consumption	Net trade
	Net	Net	Net
<u>Million metric tons</u>			
Developed:			
Japan	1.2	4.8	-3.6
EC	28.8	27.7	1.3
Other importers	14.8	20.8	-6.0
Major exporters 2/	64.5	25.5	41.4
Total, developed	109.3	78.8	33.0
Central plan	106.8	120.7	-13.8
Less developed:			
Importers 3/	39.1	62.4	-23.3
Exporters 3/	7.9	3.9	5.1
Total, less developed	47.0	66.3	-18.2
World total	263.1	265.7	361.8

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

2/ United States, Canada, and Australia.

3/ Argentina.

production is projected at 11 million tons, somewhat below the 1964-66 average and reflecting an expected drop in consumption by 1980. On the other hand, the projected annual growth rate for the less developed importing countries is 2.7 percent and for the less developed exporters, 3.9 percent. However, these high growth rates are partly due to below-trend production in the base period.

In contrast to wheat and rice production, coarse grain production by the developed exporters is expected to rise substantially, reflecting mostly an increase in domestic demand. Production is expected to increase at an annual rate of 2.9 percent to 246 million tons. With continued self-sufficiency objectives and high internal prices, production of coarse grains in developed importing countries is also expected to increase at the same annual rate of 2.9 percent. Production of coarse grains in the less developed countries is expected to increase at a high annual rate of 2.9 percent, even though wheat and rice are expected to receive the brunt of the impact of the "Green Revolution."

The consumption projections for wheat indicate relatively high rates of population and income growth in the LDC's, combined with a significant positive response to income. Consumption in the LDC's would increase 70 percent, with the gains being uniformly high throughout the area. On the other hand, for the developed area, the projections reflect a sluggish demand, consistent with a generally negative demand response to income and a relatively low rate of population growth. For the major exporters and the developed importers excluding Japan, consumption would increase at a rate of 0.8 percent per year, or less than growth in population. For Japan, consumption of wheat would increase at an annual rate of 3.1 percent to 7.3 million tons, reflecting substitution of wheat for rice as the diet continues to diversify.

Perhaps the most surprising development of the projections for wheat under set I is the fact that net imports for the LDC's increase 45 percent. The only less developed region to show a drop in imports is South Asia, whose imports would decline by 7.0 million tons from the very high level of 9.3 million tons in the base period.<sup>15</sup> Net imports of the developed importers would decline, since Other Western Europe would become a slight net exporter by 1980, and net exports of the EC would increase threefold. Japan, on the other hand, would remain a

growing market, with imports increasing 80 percent to 6.5 million tons. Trade in the central plan region also would change markedly, with the Soviet Union shifting from a net importer back to its traditional net export role by 1980. The net result of these trade changes as they affect the major exporters would be nearly offsetting, although these countries' exports would be down slightly from the base period, but significantly higher than in most recent years.

Demand for rice in the developed world, excluding Japan, is expected to increase substantially to a level of 3 million tons by 1980. However, per capita utilization of rice in Japan is projected to drop by 20 percent, reflecting a shift from rice as income rises. Because of the expected slight decrease in total consumption, from close to 12 million tons to a little over 11 million tons, Japan's imports are projected to decrease from about 0.8 million tons to 0.1 million.

Utilization of rice in the LDC's is expected to increase 50 percent over the 1964-66 average; however, with a high rate of population growth, per capita gains will be small—0.1 percent a year. Recent successes in wheat production and expanding consumption may tend to hold down rice consumption, particularly in India and Pakistan, where close to half the rice in the less developed world is consumed. Net imports for the less developed world, which was a net exporter in the early 1950's, would increase slightly from the levels of 1964-66. Exports for Southeast Asia are expected to be at about 1964-66 levels but down about a third from 1959-61 levels. This region experienced difficulties in the late 1960's but could well recover more than is indicated in set I.

Rising consumer incomes in all the developed countries will stimulate continued expansion in their demand for meat and livestock products. However, the impact on trade in coarse grains and other feed inputs will vary from country to country.

In Japan, most of the increase in demand for livestock products will be reflected in imports of feed grains, soybeans, and other feed inputs. Limited room for growth in domestic grain production and continued restrictions on importation of meat will encourage increased imports of feed inputs. Prices of livestock products are expected to rise, thus slowing down the potential growth of meat consumption. But favorable product-feed price ratios should encourage imports of grain. Coarse grain imports by Japan are expected to almost triple the level of her imports in the base period.

Demand for meat is also expected to increase substantially in the EC. However, the increase is not expected to be fully reflected in coarse grain

<sup>15</sup>The reader is reminded that the base period includes the 2 severe drought years that resulted in massive food aid shipments.

Table 9.--Rice: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II <sup>1/</sup>

Exporting region	1964-66			1980--proj. set I			1980--proj. set II		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
Million metric tons									
Developed:									
Japan	11.4	11.9	-0.8	11.1	11.3	-0.2	11.0	11.4	-0.4
EC	0.5	0.7	-0.2	0.5	0.8	-0.3	0.4	0.8	-0.3
Other importers	0.4	0.7	-0.3	0.5	0.9	-0.4	0.5	0.9	-0.4
Major exporters <sup>2/</sup>	2.7	1.0	1.6	3.5	1.4	2.2	3.4	1.4	0.3
Total, developed	15.0	14.3	0.4	15.6	14.3	1.4	15.4	14.4	-0.8
Central plan	64.4	64.0	0.4	89.9	89.7	0.1	89.7	89.8	-0.1
Less developed:									
Importers	68.5	72.8	-4.3	107.6	112.4	-4.7	124.9	127.9	-3.0
Exporters <sup>3/</sup>	24.5	21.5	3.2	35.3	32.0	3.2	38.4	34.5	3.9
Total, less developed	93.0	94.3	-1.1	142.9	144.4	-1.5	163.4	162.4	0.9
World total	172.4	172.6		248.4	248.5		268.5	266.7	

<sup>1/</sup> Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

<sup>2/</sup> United States and Australia.

<sup>3/</sup> East South America, Argentina, North Africa, and Southeast Asia.

consumption. The maintenance of relatively high coarse grain prices under projection set I should encourage the substitution of feed wheat and other feedstuffs (grain byproducts, high-protein meals, cassava chips, soybeans, and beet pulp). The high price policy should also encourage substantial increases in coarse grain production. As a result, net imports of coarse grains by the EC are expected to be 10 million tons, a little below the high net import levels of 11.8 million during the mid-1960's. However, the expected import levels for the EC are higher than in the late 1960's. As indicated on page 19, it was assumed that the high cost of the CAP in the 1970's would permit some restructuring and freer access to the EC market. On the other hand, continuation of trends in the past few years could lead to self-sufficiency in total grains for the EC.

Demand for coarse grains is also expected to increase substantially in the United Kingdom and Other Western Europe, but increased production, particularly in the United Kingdom, will more than offset the expected growth in demand. Consequently, under projection set I, net imports are expected to drop by about 2 million tons. With the exception of Japan, the projected import market in the developed area for coarse grains should remain sluggish.

One of the surprising developments under set I is a 15-million-ton increase in import demand for coarse grains in the less developed area, primarily Central America, West Asia (primarily Israel), North Africa, South Asia, and East Asia. Most of the increase presupposes a growing demand for poultry meat in large urban centers, fostered by modern poultry plants. The feed inputs to these plants would be imported grains because of lower costs and the difficulty of moving domestic grain from the interior.

#### Oilseeds

Production projections were made for each of the nine major oilseeds that enter into world trade<sup>16</sup>. These projections were then converted into oil and meal equivalents.

World vegetable oil production is projected to increase by 3.5 percent per year through 1980. The annual rate of increase for the less developed countries would be 3.3 percent, compared with 3.4 percent in the central plan countries and 3.8 percent in the developed countries. The countries or regions with the largest projected quantity increases are the

United States, East Asia and the Pacific Islands, the USSR, and South Asia. The increased production in East Asia would come mainly from palm oil and coconut oil, while for South Asia the increase would come mainly from peanut oil.

World oilcake production is projected to increase by 3.4 percent per year through 1980. The projected annual rate of increase for the less developed countries is 3.3 percent, compared with 3.6 percent in the developed countries and 3.1 percent in the central plan countries.

Given these production levels, the supply of oilcake would clear the market at base period prices, but equilibrium in vegetable oils would result in a drop in world prices of about 20 percent. The projected rate of increase in the demand for vegetable oils in the less developed countries is twice as great as that in the developed countries. In the central plan countries, the rate of increase is projected to be somewhat below that in the LDC's. The rapid increase in demand by the less developed areas is expected partly because of their rapid population growth and partly because of their strong consumption response to higher incomes. In many of the developed countries, consumption of vegetable oils appears to have reached near saturation levels and consequently there is little consumption response to higher income levels. If the USSR is to meet its increasing demands for oils from domestic production, it will have little or no supplies to put on the world market by 1980.

The less developed countries as a whole were large net exporters of vegetable oil during the mid-1960's. But because of rapidly increasing demands, their net export availabilities are projected to be lower by 1980.

The import demand for oilcakes is presently centered in the developed countries, particularly Japan and the EC. Rising EC imports are partly due to the substitution of oilcakes for relatively high-priced grain in feed rations. The less developed areas' projected increase in oilcake production is substantially above their estimated increase in demand, and the resulting increased export availability is expected to find a market, primarily in the West European countries. Oilcake exports by the United States, the major world exporter of this commodity, are expected to increase steadily through 1980.

#### Cotton

Several sets of production and consumption levels for all regions of the world were projected to 1980 under prices ranging from 24 cents to 30 cents,

<sup>16</sup>These are soybeans, peanuts, cottonseed, sunflower seed, rapeseed, copra, palm kernels, palm oil, and olive oil.

Table 10.--Coarse grains: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II <sup>1/</sup>

Exporting region	1964-66			1980--proj. set I			1980--proj. set II		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
<u>Million metric tons</u>									
Developed:									
Japan	1.4	7.5	-6.0	1.0	17.7	-16.7	1.0	18.2	-17.2
EC	30.9	43.0	-11.8	50.8	60.8	-10.0	50.6	59.9	-9.3
Other importers	28.9	37.9	-9.0	42.6	49.4	-6.8	42.3	51.4	-9.1
Major exporters <sup>2/</sup>	159.0	145.0	23.6	246.2	207.7	37.8	242.0	212.8	27.5
Total, developed	220.1	233.4	-3.3	340.6	335.7	4.2	335.9	342.4	-8.1
Central plan	142.5	142.5	<u>4/</u>	199.9	198.4	1.5	199.8	198.6	1.2
Less developed:									
Importers	72.0	73.6	-1.6	106.3	122.8	-16.6	122.7	133.5	-10.7
Exporters <sup>3/</sup>	34.1	27.6	6.6	57.0	46.2	10.8	67.6	49.9	17.6
Total, less developed	106.1	101.1	5.0	163.3	169.0	-5.8	190.3	183.4	6.9
World total	468.7	477.0		703.8	703.1		726.0	724.3	

<sup>1/</sup> Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

<sup>2/</sup> United States, Canada, Australia, and South Africa.

<sup>3/</sup> Argentina, East South America, East Africa, and Southeast Asia.

<sup>4/</sup> Less than 50,000 metric tons.

Table 11.--Oilcakes: Production, consumption, and trade, 1963-65 average, and projections to 1980 under projection sets I, II, and III 1/

Exporting region	1963-65			1980--proj. set I		
	Production	Consumption	Net trade	Production	Consumption	Net trade
<u>Million metric tons</u>						
Developed:						
Japan	0.1	1.9	-1.8	---	4.9	-4.9
EC	0.3	5.3	-5.0	0.7	10.4	-9.7
Other importers	0.8	5.0	-4.2	1.4	9.6	-8.2
Major exporters <u>2/</u>	18.3	12.4	5.9	32.1	15.4	16.7
Total, developed	19.5	24.6	-5.1	34.2	40.3	-6.1
Central plan	8.4	8.7	-0.4	13.6	13.9	-0.3
Less developed:						
Importers	---	---	---	---	---	---
Exporters	10.8	6.2	4.6	18.3	11.9	6.3
Total, less developed	10.8	6.2	4.6	18.3	11.9	6.3
World total	38.6	39.5		66.1	66.1	
<u>1980--proj. set II</u>						
Exporting region	Production	Consumption	Net trade	Production	Consumption	Net trade
	<u>Million metric tons</u>					
Developed:						
Japan	---	5.0	-5.0	---	4.8	-4.8
EC	0.7	11.9	-11.2	0.7	9.5	-8.7
Other importers	1.4	11.1	-9.7	1.4	8.6	-7.2
Major exporters <u>2/</u>	32.1	15.9	16.2	32.1	15.1	17.0
Total, developed	34.2	43.9	-9.7	34.2	37.9	-3.7
Central plan	13.6	14.2	-0.6	13.6	13.7	---
Less developed:						
Importers	---	---	---	---	---	---
Exporters	22.5	12.2	10.3	15.5	11.8	3.8
Total, less developed	22.5	12.2	10.3	15.5	11.8	3.8
World total	70.3	70.3		63.4	63.4	

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ United States, Australia, New Zealand, and South Africa.

Table 12.--Vegetable oil: Production, consumption, and trade, 1963-65 average, and projections to 1980 under projection sets I, II, and III 1/

Exporting region	1963-65			1980--proj. set I		
	Production	Consumption	Net trade	Production	Consumption	Net trade
	<u>Million metric tons</u>					
<b>Developed:</b>						
Japan	2/	0.4	-0.4	---	0.8	-0.8
EC	0.5	2.3	-1.8	1.0	3.2	-2.2
Other importers	0.8	1.9	-1.0	1.2	2.5	-1.3
Other exporters <u>3/</u>	4.3	3.2	1.2	8.1	4.6	3.5
Total, developed	5.7	7.8	-2.1	10.3	11.1	-0.8
Central plan	3.8	3.8	-0.1	6.5	6.7	-0.2
<b>Less developed:</b>						
Importers	4.1	4.5	-0.3	7.3	9.4	-2.2
Exporters <u>4/</u>	4.7	2.3	2.5	7.5	4.4	3.2
Total, less developed	8.9	6.7	2.2	14.8	13.8	1.0
World total	18.4	18.2		31.6	31.6	
<b>1980--proj. set II</b>						
Exporting region	Production	Consumption	Net trade	Production	Consumption	Net trade
	Production	Consumption	Net trade	Production	Consumption	Net trade
	<u>Million metric tons</u>					
<b>Developed:</b>						
Japan	---	0.9	-0.9	---	0.8	-0.8
EC	1.0	3.3	-2.3	1.0	3.2	-2.2
Other importers	1.2	2.6	-1.4	1.2	2.5	-1.2
Other exporters <u>3/</u>	8.1	4.6	3.5	8.1	4.6	3.6
Total, developed	10.3	11.3	-1.0	10.3	11.0	-0.6
Central plan	6.5	7.0	-0.5	6.5	6.6	-0.1
<b>Less developed:</b>						
Importers	9.3	11.8	-2.5	6.1	8.1	-1.9
Exporters <u>4/</u>	9.2	5.2	4.0	6.6	3.9	2.7
Total, less developed	18.4	16.9	1.5	12.7	11.9	0.8
World total	35.3	35.3		29.6	29.6	

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ Less than 50,000 metric tons.

3/ United States and South Africa.

4/ East Africa, West Africa, and East Asia and the Pacific Islands.

Table 13.--Cotton: Production, consumption, and trade, 1965-67 average, and projections to 1980 under projection sets I, II, and III 1/

Exporting region	1965-67				1980--proj. set I			
	Production	Consumption	Net trade		Production	Consumption	Net trade	
	Tex-tiles	Lint	Tex-tiles		Tex-tiles	Lint	Tex-tiles	
<u>Million metric tons</u>								
<b>Developed:</b>								
Japan	---	0.5	0.2	-0.7	---	0.7	0.1	-0.8
EC	---	0.8	2/	-0.9	---	1.0	-0.1	-0.9
Other importers	0.2	1.1	-0.2	-0.5	0.3	1.2	-0.3	-0.6
Exporters 3/	2.3	2.2	-0.1	0.8	2.7	2.2	-0.2	0.8
Total, developed	2.5	4.6	-0.1	-1.3	3.0	5.1	-0.6	-1.5
Central plan	3.5	3.5	0.1	-0.4	4.4	4.8	0.1	-0.4
<b>Less developed:</b>								
Importers	1.1	1.5	0.1	-0.5	1.7	2.4	0.3	-1.0
Exporters 4/	3.8	1.7	-0.1	2.2	5.6	2.6	0.1	3.0
Total, less developed	4.9	3.2	---	1.7	7.4	4.9	0.4	2.0
World total	10.9	11.2			14.8	14.8		
<u>1980--proj. set II</u>								
<u>1980--proj. set III</u>								
Exporting region	Production	Consumption	Net trade		Production	Consumption	Net trade	
	Tex-tiles	Lint	Tex-tiles		Tex-tiles	Lint	Tex-tiles	
	Tex-tiles	Lint	Tex-tiles		Tex-tiles	Lint	Tex-tiles	
<u>Million metric tons</u>								
<b>Developed:</b>								
Japan	---	0.7	0.1	-0.8	---	0.7	0.1	-0.8
EC	---	1.0	-0.1	-0.9	---	1.0	-0.1	-0.9
Other importers	0.3	1.2	-0.3	-0.6	0.3	1.2	-0.3	-0.6
Exporters 3/	3.1	2.2	-0.2	1.2	2.7	2.2	-0.2	0.8
Total, developed	3.4	5.1	-0.5	-1.2	3.0	5.1	-0.6	-1.5
Central plan	4.4	4.8	0.1	-0.5	4.4	4.8	0.1	-0.4
<b>Less developed:</b>								
Importers	2.0	2.9	0.3	-1.2	1.6	2.1	0.4	-0.9
Exporters 4/	6.3	3.3	0.1	2.9	5.1	2.3	0.1	2.8
Total, less developed	8.3	6.2	0.4	1.7	6.7	4.3	0.5	1.9
World total	16.1	16.1			14.2	14.2		

1/ All projection sets assume a 26-cent SM-1-1/16-inch cotton, c.i.f., Liverpool, 1968 constant currency cotton price. Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ Less than .05 million metric tons.

3/ United States.

4/ Latin America, Africa, West Asia, and Pakistan, based on lint trade.

at 2-cent increments.<sup>17</sup> It was assumed that the United States, the world's principal producer and exporter of cotton lint, would adjust supplies and exports in a manner that would permit world supply and demand to balance.

Given the 26-cent price level, world cotton production and consumption would increase at a rate slightly above 2 percent per year. Production in the LDC's would increase more rapidly than in the other areas, reaching 7.4 million tons, or 50 percent of the world total. The more rapid growth of production in the LDC's is attributed to the importance of cotton as a foreign exchange earner and the need to supply growing domestic textile industries.

World consumption of fibers for clothing and household use would increase greatly by 1980, but the increase should be greater in the developed regions and higher income central plan countries than in the LDC's.

The already very large gap between per capita fiber consumption in the developed and less developed countries would widen if presently high consumption levels are maintained in the developed countries as income growth accelerates and if the income elasticity of demand does not decline much lower than that in the less developed countries.

Because of changing technology and consumer tastes, world demand for cotton is projected to rise less rapidly than that for total fibers. However, in cotton-producing less developed countries with new or expanding textile industries, cotton consumption is expected to rise faster than total fiber consumption. Cotton's share of total fiber use in most nonproducing less developed regions has not and is not expected to decline as rapidly as in the developed area. Thus, the growth rate of cotton consumption is expected to be relatively high in the LDC's (over 3 percent per annum), more moderate for the central plan area, and stagnant for the developed area.

The LDC's would increase their share of world cotton lint and textile exports by 1980, and the developed countries would increase their net imports. The trade position of the central plan area in 1980 would approximate that of 1965-67. The greatest changes for the LDC's are projected for cotton textile trade. Low export price policies, self-sufficiency objectives in textiles, and already established markets

in the developed area should help the less developed regions become substantial net exporters of cotton textiles by 1980. On the other hand, net cotton textile imports of the developed area should increase from a little over 100,000 tons in 1965-67 to almost 600,000 tons in 1980.

#### Bananas

World production of bananas is projected to increase by 3.5 percent per year by 1980, or from 23.3 million to 39.3 million tons. At this rate, world production would exceed the rate of growth in consumption in developed countries by about 1 percent per year—indicating a potential surplus, since the developed countries account for about 95 percent of world exports. However, imports and consumption, although small in the central plan countries and nonproducing less developed countries, are projected to increase enough in these countries to maintain current price levels.

Growth in world demand is projected to increase slightly faster than world population, indicating a continued increase in per capita consumption. The rate of growth in demand in the United States, the world's largest market for bananas, is projected to exceed growth in population by only 0.5 percent per year, reflecting a very slow rate of increase in per capita consumption. The rate of growth in the EC is estimated to significantly exceed the population growth rate, primarily because of the large increase in imports by Italy. The largest relative increase in demand and imports of bananas is projected for Japan—about 6 percent a year. At this rate of growth, the absolute increase would be more than the actual level of consumption of 375,000 tons in 1964-66.

#### Beverages

Coffee.—World production of coffee is projected to increase by 2.1 percent per year by 1980, or from 4.0 million tons in 1964-66 to 5.5 million tons. At this rate, world production would exceed the rate of growth in consumption in the developed countries by 0.3 percent per year—indicating a potential surplus since the developed countries account for 88 percent of world imports. However, imports and consumption in the central plan countries and nonproducing less developed countries, although small, are projected to increase enough to maintain current price levels.

Growth in demand for coffee beans in the developed countries is projected to increase faster than population (1.8 percent vs. 1.0 percent per year), indicating a continued increase in per capita consumption. This growth in demand is projected to

<sup>17</sup>Prices refer to SM-1-1/16-inch cotton, c.i.f., Liverpool, 1968 constant currency.

be centered primarily in Western Europe and other developed countries excluding the United States. The rate of growth in demand for coffee beans in the United States, the world's largest market, is projected to increase only 0.4 percent per year, or 1 percent less than the rate of growth in population by 1980. However, per capita consumption is expected to remain constant or increase only slightly on a liquid cup basis. Recent processing technology in the United States has made possible more liquid cups per pound of beans and has reduced the actual demand for beans. This factor, when considered in conjunction with a sluggish growth in per capita demand for coffee, has slowed the demand for coffee beans and is projected to continue its influence on demand over the next decade.

**Tea.**—World production of tea is projected to increase about 2.2 percent per year by 1980, or from 1.1 million tons in the base period to 1.6 million tons. At this rate, world production would exceed slightly the rate of growth in world population (2.0 percent), indicating a very small increase in per capita consumption. The slowest rate of growth in consumption would be centered in the developed countries—especially the United Kingdom, the world's largest importer. Total U.K. consumption is projected to remain almost constant. Per capita consumption in the United Kingdom has declined in recent years as consumers have tended to substitute coffee for tea. Similar trends are evident in Canada and Australia. Japan is projected to increase its net imports, as domestic production would continue to increase slower than consumption. The major share of the increase in world tea consumption is projected to be in the less developed countries, where no apparent changes in consumer tastes have emerged with respect to coffee and tea consumption.

**Cocoa.**—World production of cocoa beans in 1980 is projected to increase 3.2 percent per year, or from 1.3 million tons in 1964-66 to 2.1 million tons. Growth in consumption in the developed countries is projected to increase 2.8 percent per year, while a higher rate is projected for the central plan (4.4 percent) and less developed importing countries (3.8 percent). These rates of growth in consumption would maintain current price levels for cocoa beans and would reflect total utilization—both beverage and nonbeverage uses. Within the developed countries, the EC countries are projected to increase their consumption by 3.7 percent per year or from 309 to 534 million tons. At this level, the EC consumption would slightly exceed that projected for the United States and Canada. The rapid rate of growth in projected consumption for the central plan countries reflects the high income elasticity of demand for cocoa and products expected in these countries.

#### Projection Set II

Under projection set II, the annual growth in production in the less developed countries was assumed to increase over the rate used in set I by a factor of 1.4. This assumption was based on what might be termed an "accelerated Green Revolution," which would trigger growth in income and demand. All other assumptions are the same as in set I, the base of comparison for set II.

#### Wheat

The increase in total grains production in South Asia affects imports of wheat more than imports of rice and coarse grains. Imports of wheat by the LDC's would decline sharply from those projected under set I. South Asia, for example, would shift from a net import position of 2.5 million tons to a net export position of 7 million tons. Major exporters, in line with the assumed price maintenance policy, would reduce wheat exports by about 9 million tons to prevent world wheat prices from falling more than 10 percent below prices in set I. Under these conditions, the export market for wheat would weaken, the price of wheat would fall, relative to that of coarse grains, and the consumption of wheat for feed would increase. Production and consumption of wheat by the major developed importers would not be materially affected by the projected increase in production in the less developed world. However, increased feeding of wheat in the EC should reduce exports of wheat and lead to reduced import requirements of coarse grains.

#### Rice

Total consumption of rice in the developed areas, excluding Japan but including Eastern Europe and the Soviet Union, is projected at 5 million tons, or 2 percent of world consumption. These areas are expected to import 1.4 million tons of rice—about one-half of which would come from developed exporters. These imports would comprise less than a fourth of the expected world trade in rice of 6.3 million tons, compared with about a fifth in the base period. The equivalent projected import market for rice of close to 5 million tons is in the LDC's—more than half of which tonnage would be supplied by less developed exporters. The United States, Australia, and Communist Asia would supply most of the remainder.

With projected increased production in the less developed importing countries, imports would be reduced. And since the bulk of the rice exports of the LDC's would go to other LDC's, the projected decrease in import needs by less developed importing

Table 14. --Bananas: Production, consumption and trade, 1964-66 average, and projections to 1980 under projection sets I and II 1/

Exporting region	1964-66			1980--proj. set I			1980--proj. set II		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
<u>1,000 metric tons</u>									
Developed:									
U.S. and Canada	0	1,799	-1,799	0	2,402	-2,402	0	2,618	-2,618
Japan	0	375	-375	0	871	-871	0	1,132	-1,132
EC	0	1,396	-1,396	0	1,831	-1,831	0	2,051	-2,051
Other importers	98	776	-678	140	1,116	-976	140	1,274	-1,134
Other exporters <u>3/</u>	486	394	92	860	694	166	860	694	166
Total, developed	584	4,740	-4,156	1,000	6,914	-5,914	1,000	7,769	-6,769
Central plan	184	225	-41	296	405	-109	296	430	-134
Less developed:									
Importers	69	246	-177	156	304	-148	156	304	-148
Exporters	22,433	18,059	4,374	37,816	31,645	6,171	37,816	30,765	7,051
Total, less developed	22,502	18,305	4,197	37,972	31,949	6,023	37,972	31,069	6,903
World total	23,270	23,270	---	39,268	39,268	---	39,268	39,268	---

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

2/ Consumption in less developed countries is a residual representing domestic consumption, waste, and spoilage.

3/ Spain and Australia.

Table 15. --Coffee: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II  $\frac{1}{4}$

Exporting region		1964-66	1980--proj. set I	1980--proj. set II					
Production	Consumption	Net	Production	Consumption	Net	Production	Consumption	Net	
tion 2/	tion 2/	trade	tion 2/	tion 2/	trade	tion 2/	tion 2/	trade	
<u>1,000 metric tons</u>									
Developed:									
U.S.	3	1,282	-1,279	4	1,359	-1,355	5	1,388	-1,383
EC	0	754	-754	0	1,075	-1,075	0	1,179	-1,179
Other importers	0	524	-524	0	902	-902	0	1,146	-1,146
Total, developed	3	2,560	-2,557	4	3,336	-3,332	5	3,713	-3,708
Central plan	2	115	-113	3	302	-299	3	331	-328
Less developed:									
Importers	230	385	-155	315	547	-232	351	627	-276
Exporters	3,747	922	2,825	5,131	1,268	3,863	5,727	1,415	4,312
Total, less developed	3,977	1,307	2,670	5,446	1,815	3,631	6,078	2,042	4,036
World total	3,982	3,982	---	5,453	5,453	---	6,086	6,086	---

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

2/ Consumption in less developed countries is a residual representing domestic consumption, stocks, and waste.

Table 16.--Tea: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II 1/

Exporting region	1964-66			1980--proj. set I			1980--proj. set II		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
1,000 metric tons.									
Developed:									
U.S.	0	59	-59	0	94	-94	0	96	-96
EC	0	23	-23	0	49	-49	0	49	-49
U.K.	0	223	-223	0	224	-224	0	204	-204
Japan	81	82	-1	112	124	-12	115	128	-13
Other importers	0	92	-92	0	121	-121	0	117	-117
Total, developed	81	479	-398	112	612	-500	115	594	-479
Central plan	214	217	-3	296	307	-11	303	316	-13
Less developed:									
Importers	44	207	-163	61	331	-270	62	369	-307
Exporters	810	246	564	1,121	340	781	1,147	348	799
Total, less developed	854	453	401	1,182	671	511	1,209	717	492
World total	1,149	1,149	---	1,590	1,590	---	1,627	1,627	---

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

2/ Consumption in the less developed countries is a residual representing domestic consumption, stocks, and waste.

Table 17.--Cocoa: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II <sup>1/</sup>

Exporting region	1964-66			1980--proj. set I			1980--proj. set II		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
<u>1,000 metric tons</u>									
Developed:									
U.S. and Canada	0	389	-389	0	532	-532	0	680	-680
EC	0	309	-309	0	534	-534	0	584	-584
Other importers	0	314	-314	0	478	-478	0	533	-533
Total, developed	0	1,012	-1,012	0	1,544	-1,544	0	1,797	-1,797
Central plan	0	157	-157	0	302	-302	0	347	-347
Less developed:									
Importers	25	84	-59	40	148	-108	46	174	-128
Exporters	1,292	64	1,228	2,055	101	1,954	2,390	118	2,272
Total, less developed	1,317	148	1,169	2,095	249	1,846	2,436	292	2,144
World total	1,317	1,317	---	2,095	2,095	---	2,436	2,436	---

<sup>1/</sup> Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

<sup>2/</sup> Includes cocoa and products on a bean basis; consumption includes domestic consumption, stocks and waste.

countries would dampen any substantial increase in rice exports by the less developed exporters that might have resulted from their expanding output. Under these conditions, world trade prices in rice would be lower, but would be kept from falling precipitously by a sizable reduction in U.S. exports. Thus, the price change would not be large enough to influence the production and consumption patterns of developed importers.

#### Coarse Grains

Increased coarse grain production in the LDC's would shift the less developed world from a net importer position to a net exporter one. Developed exporters would still continue to ship feed grains to LDC's with developing livestock economies as well as to less developed areas with commercial markets, such as Hong Kong, Israel, and Taiwan. However, exports from Argentina, East Africa, and Southeast Asia to Japan and Western Europe would be expected to increase above the level under set I. There would be some increase in imports by the developed importers, but not in the EC. In fact, EC imports of coarse grains would fall because of increased use of wheat for feed, even though consumption of total grains would increase. Little change is projected in the production-consumption balance in the central plan countries. The net effect of these production and trade shifts on the developed exporters would be a drop in exports of about 10 million tons from the level under set I, with the United States accounting for the major share of this decline.

#### Oilseeds

With the assumed increase in production and income in the LDC's, a 31-percent reduction in prices of vegetable oils from the base level would be required to bring into balance the new production and consumption levels. Consumption would be expected to increase only slightly in the developed area because of the very low price response. But consumption would increase substantially in the less developed regions because of the higher price response and the added income effect. The effect on trade, compared with that under projection set I, would be to increase imports in all importing regions. From the export side, exports would decline slightly for the developed exporters and increase for the less developed exporters.

The increase in LDC oilseed production in projection set II is equivalent to an additional 4.2 million tons of oilcakes to world supplies. Consequently, to bring this new supply into balance by increasing consumption at the world level, prices

for oilcake would have to drop 13 percent from the 1963-65 levels. Practically all of this increase would come from the developed area, which accounts for the bulk of the market.

#### Cotton

A higher rate of growth in income and cotton production is assumed for the less developed area than that under set I. Under these conditions, the production of cotton lint in the LDC's would be about 12 percent higher, while cotton consumption would be about 27 percent higher. In other words, cotton consumption in the less developed area would increase at an annual rate of about 4.8 percent, while cotton lint production would increase at only about 3.8 percent per year. With this large increase in demand for cotton products, net exports would be lower than projected under set I, with little or no change in net textile exports. Thus, the exports of the principal LDC textile suppliers (Hong Kong, India, Pakistan, UAR, Taiwan, and South Korea) would be greater under set II than under set I, but purchases by the LDC importers (principally tropical African countries and Indonesia) would also increase. On the other hand, with higher cotton consumption in the LDC's, exports of more cotton lint and textiles by the developed and central plan countries to the less developed area would be possible.

#### Bananas

Under projection set II, exports of the LDC's would increase 15 percent over the level of projection set I. For some producing countries, this increase would involve planting new varieties for a higher quality fruit needed for exports, while in others it would involve a reduction in waste through improved transportation and marketing facilities. These possibilities for expanding exports exist in most of the LDC's.

With expanded exports and lower prices, consumption and imports of bananas would increase by 1980 in the developed countries by 3.3 percent per year, compared with 2.4 percent under projection set I. Lower prices would stimulate consumption in the developed countries and increase net imports by about 900,000 tons above the 5.9 million tons projected under set I. Consumption would also increase in the central plan countries, but the absolute increase would be small since these countries represent relatively small market outlets for bananas. By increasing exports by 15 percent above the equilibrium level projected under set I, world prices would fall by 30 percent and export earnings by 20 percent.

## Beverage Crops

Under projection set II, exports of the LDC's would increase over the level of set I. Coffee exports would increase 12 percent, tea 2.4 percent, and cocoa beans, 16 percent.

With expanded exports and lower prices, consumption and imports of coffee and cocoa would increase in the developed countries by 1980 by 11 percent and 16 percent, respectively. However, imports of tea would decline by 4 percent as high income consumers would tend to substitute coffee and cocoa, primarily coffee, for tea. Lower prices would stimulate consumption of coffee and increase net imports by 376,000 tons above the 3.3 million tons projected under projection set I. Net imports of cocoa would increase by 253,000 tons, but net imports of tea would decline about 20,000 tons from the level under projection set I. For all these beverage crops, net imports in the central plan and nonproducing less developed countries would increase over those projected under set I. In the central plan countries, the largest increase in net imports would be in cocoa beans and coffee. Tea imports would be largest in the LDC's. If exports of these three crops are increased by the above percentages over the equilibrium level projected under set I, world prices would fall by 30 percent. Export earnings would fall 22 percent for coffee, 28 percent for tea, and 19 percent for cocoa. Under these conditions, tea-exporting countries would be hardest hit. And in view of the relatively higher costs of production, these prices would force many tea producers out of tea production and into production of coffee or cocoa if these were feasible alternatives.

### Projection Set II-A

Under this set, a market-share assumption is invoked to determine what would happen if the major developed exporters of grain and cotton adopted a policy to maintain their traditional share of the world market. Other assumptions are the same as in projection set II and comparisons are made with that set.

Production and exports of major exporters would be substantially higher. But grain prices would drop precipitously from the levels of set II. Lower price levels would bring wheat into a competitive position with feed grains, which would result in a sharp rise in the use of wheat for feed. The EC would shift from a net exporter to a net importer of wheat. Consequently, increased feed use of wheat in the EC would limit growth of imports of coarse grains. Wheat and coarse grain imports would increase in response to lower world prices, but the increase would be limited since internal prices would not drop

by the full amount. In South Asia, wheat exports would drop to 6 million tons, compared with 7 million tons under projection set II. Coarse grain imports would rise slightly. Argentine wheat and coarse grain exports, which are sensitive to world prices, would drop substantially as a result of the greatly reduced prices. Southeast Asia's exports of coarse grains would also decline but not to the extent of the decline for Argentina, since Southeast Asia is less sensitive to world price changes.

With rice, the less developed exporters would lose some of their export share as the developed exporters push to regain their market shares. But in response to the lower prices, total import demand for rice would increase, especially in the less developed world. Lower prices and increased production should increase consumption in producing less developed countries as some rice now could be fed to livestock in competition with other grains.

### Projection Set II-B

Thus far in the sequence of projection sets, the major developed importers would have continued the policy of relatively high internal prices. The basic change in assumptions under projection set II-B is that the developed importers would become more sensitive to world grain prices and adjust their high internal prices to changes in world prices. The results of projection set II-B should be compared with those of set II-A.

With lower internal grain prices, both grain consumption and imports in the developed importing countries should increase. However, the increases in wheat consumption would be modest except in the EC, where the increase for feed would be substantially above the level under set II-A. Coarse grain consumption would increase substantially in all the developed importing countries, thereby increasing imports. Coarse grain imports for the developed importers would increase by 6 million tons over the level of set II-A. Import trade for rice also would increase significantly. The export share of the developed and less developed exporters would rise, with both areas benefitting from a more rapid expansion in import demand.

### Projection Set III

What might the situation be if the "Green Revolution" was short-lived and production growth lapsed to lower rates? To answer this question, the annual growth in production in the less developed countries was assumed to decrease below the rate of projection set I by a factor of 0.7. Income growth and demand would also be reduced. Other assumptions are the same as in projection set I, which

Table 18.--Wheat: Production, consumption, and trade, projections to 1980 under projection sets II-A, II-B, and III 1/

Exporting region	1980--proj. set II-A			1980--proj. set II-B			1980--proj. set III		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
Million metric tons									
Developed:									
Japan	0.8	7.7	-6.9	0.8	8.1	-7.3	0.8	7.3	-6.5
EC	34.9	36.6	-1.7	33.0	36.6	-3.7	36.0	31.1	4.9
Other importers	16.7	22.6	-5.9	16.4	22.4	-6.0	16.9	21.3	-4.4
Major exporters 2/	97.4	42.6	43.7	88.8	37.2	43.1	74.2	27.6	44.9
Total, developed	149.8	109.5	29.1	139.0	104.3	26.1	128.0	87.3	38.9
Central plan	149.6	155.6	-5.7	150.3	155.1	-4.8	151.0	154.3	-3.3
Less developed:									
Importers	94.1	122.0	-27.9	94.4	120.8	-26.4	63.7	103.3	-39.7
Exporters 3/	9.2	4.7	4.5	9.7	4.6	5.1	8.9	4.8	4.1
Total, less developed	103.3	126.8	-23.4	104.2	125.4	-21.2	72.6	108.2	-35.6
World total	403.0	391.8		393.5	384.8		351.6	349.8	

1/ Set III-A assumes that major developed exporters would maintain their traditional share of the world market. Set II-B assumes that the major developed importers would become more sensitive to world grain prices and adjust their high internal prices to changes in world prices. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ United States, Canada, and Australia.

3/ Argentina.

Table 19.--Rice: Production, consumption, and trade, projections to 1980 under projection sets II-A, II-B, and III 1/

Exporting region	:	1980--proj.	set II-A	:	1980--proj.	set II-B	:	1980--proj.	set III									
<u>Million metric tons</u>																		
Developed:																		
Japan	:	10.9	11.3	-0.4	10.7	11.2	-0.5	11.2	11.3									
EC	:	0.4	0.8	-0.3	0.4	0.8	-0.4	0.5	0.8									
Other importers	:	0.5	0.9	-0.4	0.5	0.9	-0.5	0.5	0.9									
Major exporters <u>2/</u>	:	3.4	1.3	2.1	3.4	1.4	2.2	3.5	1.4									
Total, developed	:	15.3	14.4	0.9	15.0	14.3	0.8	15.7	14.3									
Central plan	:	89.7	89.8	-0.1	89.7	89.8	-0.1	89.9	89.7									
Less developed:																		
Importers	:	124.4	128.4	-4.0	124.4	128.5	-4.1	96.0	102.2									
Exporters <u>3/</u>	:	37.9	34.7	3.2	38.0	34.7	3.4	32.6	29.1									
Total, less developed	:	162.3	163.1	-0.8	162.5	163.2	-0.7	128.6	131.3									
World total	:	267.2	267.3		267.2	267.3		234.2	235.3									

1/ Set II-A assumes that major developed exporters would maintain their traditional share of the world market. Set II-B assumes that the major developed importers would become more sensitive to world grain prices and adjust their high internal prices to changes in world prices. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ United States and Australia.

3/ East South America, Argentina, North Africa, and Southeast Asia.

Table 20.--Coarse grains: Production, consumption, and trade, projections to 1980 under projection sets II-A, II-B, and III 1/

Exporting region	1980--proj. set II-A			1980--proj. set II-B			1980--proj. set III		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
<u>Million metric tons</u>									
Developed:									
Japan	1.0	20.4	-19.4	1.0	21.5	-20.5	1.0	17.4	-16.4
EC	50.1	59.8	-9.7	50.3	62.8	-12.6	50.8	60.7	-9.9
Other importers	41.9	54.9	-13.0	40.1	55.2	-15.1	42.8	48.9	-6.2
Major exporters 2/	266.3	221.3	41.0	264.3	217.7	43.8	249.1	204.4	44.6
Total, developed	359.3	356.4	-1.0	355.8	357.3	-4.3	343.7	331.5	12.1
39 Central plan	199.0	199.2	-0.1	199.4	198.9	0.5	200.0	198.3	1.7
Less developed:									
Importers	121.9	134.9	-12.9	122.3	134.2	-11.9	95.4	116.1	-20.8
Exporters 3/	65.9	51.9	14.0	66.8	51.0	15.8	50.4	43.5	6.9
Total, less developed	187.9	186.8	1.1	189.1	185.2	3.9	145.7	159.6	-13.9
World total	746.2	742.4		744.2	741.4		689.4	689.4	

1/ Set II-A assumes that major developed exporters would maintain their traditional share of the world market. Set II-B assumes that the major developed importers would become more sensitive to world grain prices and adjust their high internal prices to changes in world prices. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ United States, Canada, Australia, and South Africa.

3/ Argentina, East South America, East Africa, and Southeast Asia.

is the base for comparison with projection set III.

#### Wheat

Because of their unused production capacity, the developed exporters would be able to supply any increase in import requirements arising from deceleration of production growth in the LDC's. Thus, world prices would be kept from rising sharply above levels under projection set I. Wheat imports of the less developed importers would increase by 6 million tons over set I levels. The impact of the slower growth rate in production on trade would be mitigated by reduced consumption via the income effect and also directly in the noncommercial sector via the supply constraint. The EC would increase its exports of wheat because the world price of wheat would rise relative to coarse grain production. Specifically, the impact on world prices in this alternative is greater for wheat than for coarse grains since the bulk of the consumption of coarse grains is in the developed countries.

#### Rice

Under set III, production of rice in the less developed countries would be 14 million tons lower; however, imports are expected to increase only by 1.2 million tons over set I levels. This surprisingly small increase would occur because: (1) during periods of shortfalls in grain production, the world price of rice rises more than that for wheat and coarse grains; thus, it would be cheaper for the LDC's to import wheat and coarse grains; and (2) consumption of rice in the LDC's is also reduced. The United States is expected to increase its exports of rice substantially while the net import position of the developed importers will vary little from set I levels. Possibly, Communist Asia might ship more rice and import less wheat than indicated under projection set III because of the higher relative rice price under this set than in projection set I.

#### Coarse Grains

Net imports of the less developed world would increase by 8 million tons above the levels indicated in projection set I. Half of this change is attributed to increased imports and the other half to decreased exports. The production decrease over levels in projection set I would have little effect on the export position of the central plan countries or the developed importers but would result in larger shipments from the developed exporters.

#### Oilseeds

With the reduced production of vegetable oils and income from them in the LDC's, world prices of

oils would have to be substantially higher than their levels under projection set I but would still be 13 percent below the base period level to bring import requirements into balance with exportable supplies. The regional trade levels under this alternative do not vary greatly from those of set I.

With declining oilseed production in the less developed countries, the 1980 world supplies of oilcakes would be lowered by 3 million tons. It was determined that an 8-percent increase in world prices was required to bring supply and demand into equilibrium again. The adjustment in demand resulting from the price increase would be mainly in the developed regions.

#### Cotton

For projection set III, a lower rate of growth in income and cotton production was assumed for the less developed area. Under these conditions, production of cotton lint in the LDC's would be about 9 percent less than under set I. However, cotton consumption would be more than 12 percent lower. In other words, cotton consumption in the less developed area would increase at an annual rate of about 2.1 percent, while cotton lint production would increase by 2.3 percent.

With a lower rate of income growth, demand for cotton products in the LDC's would be lower, thereby enabling net textile exports to remain at the set I level. However, lint exports of several LDC's would be lower.

The assumption for projection set II for cotton would have little effect on trade and production in the developed and central plan areas.

#### Other Projection Sets

The use of a mathematical projections model for grains permitted several additional projection sets that would not have been feasible otherwise<sup>18</sup> Some of these sets were used to test the sensitivity of the coefficients in the world grain model. For example, it was found that a shortfall of 10 million tons in the production of rice in South Asia would result in an increase in imports of less than 2 million tons of rice but 6 million tons of wheat. That is, substantial changes in grain production levels in South Asia are compensated by changes in wheat trade.

Also incorporated into the world grain model was the production and consumption levels for the less developed countries projected by FAO in its

<sup>18</sup> These additional projection sets are discussed fully in the total grains study (56).

Indicative World Plan (IWP)<sup>19</sup> The overall FAO report (26) did not integrate the regional projections into a world frame, but only discussed the kind of adjustments the developed world would have to make

for the projected LDC export trade to be realized. The results and trade implications of the two sets related to the IWP are similar to those obtained and discussed under projection sets II and II-A.

## VII.—IMPLICATIONS FOR TRADE OF LESS DEVELOPED COUNTRIES

Agricultural exports contributed almost half of total export earnings of the less developed countries in the base period (1964-66). Ten years earlier the contribution was over 55 percent. The annual growth rate during this 10-year period was 2.1 percent per year. Under projection set I, value of agricultural exports of the LDC's for the products covered is projected to grow to 1980 at an annual rate of 2.1 percent, compared with 1.5 percent since the mid-1950's. At the same time, the value of imports for the same commodities is projected to grow at 3.2 percent, compared with a historical growth rate of 4.9 percent.

A striking overall conclusion at the world level is that the capacity to produce food and fiber is expected to exceed world demand in 1980 at price levels that prevailed during the base period. This result, of course, assumes continuation of present food and fiber policies. Also precluded is any major departure in consumption patterns over the 1970's, particularly with respect to the commodities covered in the study reported on here.

Explicit (or implicit) in the demand projection for the products covered is the continuation of low demand price elasticities at the world and country level. In other words, demand would continue to be not highly responsive to price changes. As a result, downward pressure on world prices would continue, with resulting slow growth in the aggregate value (demand) of the products because increased quantities would be consumed at lower prices to absorb excess supplies. Thus, maintenance of current market shares by all exporters would reduce export earnings.

Consequently, an increase in production and exports in the less developed countries may not result in an increase in their export earnings. If the contribution to trade by the LDC's is small relative to the total quantity traded in the world, an increase in

export earnings might be realized. However, if the contribution to trade is large, the inelasticity of demand at the world level would predominate and probably decrease LDC export earnings. This situation would prevail for LDC export commodities, such as tropical beverages, that are not produced in the developed world. Furthermore, continued trade constraints by developed importers would further reduce the chances of increasing export earnings from these products.

For commodities also grown in the developed world, the export earnings situation for the LDC's would largely depend on the export policies of the major developed exporters. For example, a policy by the major exporters to maintain a specific share of the market would be likely to lead to a reduction in export earnings by the LDC's. On the other hand, if major developed exporters pursued a policy to maintain relatively stable world prices export earnings of LDC's would increase. For example, the price effect of increasing production and exports by the LDC's would be moderated by withdrawal of exportable supplies from the world market by the major developed exporters. For wheat and cotton, historical evidence shows that when major exporters have withheld supplies from the world market by increasing storage programs and limiting production, sharp price declines have been avoided.

The projection variants in the project were designed to evaluate the effects of different policy considerations and production growth rates on the export earnings of the LDC's.

### Projection Set I

As mentioned earlier, the basic assumptions underlying projection set I are: (1) continuation of present food and fiber policies and (2) maintenance of reasonable world prices through supply adjustments on the part of developed exporters.

Value of exports in the LDC's for the products covered is projected to reach a level of 10.7 billion dollars in 1980, indicating an annual growth rate of 2 percent from the 1964-66 base. At the same time, the projected value of imports for the same commodities, at 6.7 billion dollars, increases at an annual rate of 3

<sup>19</sup>These estimates were taken from the 4 IWP regional reports (27, 28, 29, 30). In FAO's Indicative World Plan, consumption is projected under the assumption of constant prices; then, taking into account the resource base and developmental plans of the country, the amount of consumption coming from domestic production would be determined. The difference between the consumption and production estimates then become the exportable surplus or importable deficit.

Table 21.—Export earnings and import costs by commodity, 1964-66 average, and projections to 1980 under projection sets I, II, and III <sup>1/</sup>

Region and commodity	1964-66		1980—proj. set I		1980—proj. set II		1980—proj. set III	
	Import cost	Export value	Import cost	Export value	Import cost	Export value	Import cost	Export value
<u>Million dollars</u>								
Developed:								
Wheat	703	2,735	797	2,719	716	1,841	851	3,402
Rice	187	235	105	281	85	22	108	467
Coarse grains	1,739	1,328	2,095	2,108	1,876	1,269	2,227	2,774
Oils and oilcakes	2,046	835	3,327	2,285	3,652	1,847	3,345	2,378
Cotton textiles	631	612	1,211	344	1,136	388	1,271	344
Cotton lint	1,320	444	1,266	377	1,287	529	1,260	419
Bananas	592	24	872	35	701	28		
Coffee	2,216	60	2,895	82	2,249	64		
Tea and cocoa	905	0	1,266	0	944	0		
Total, developed	10,339	6,273	13,834	8,231	12,646	5,988		
Central plan:								
Wheat	986	---	566	307	504	275	603	330
Rice	86	135	78	92	51	41	89	121
Coarse grains	26	25	20	105	21	74	18	128
Oils and oilcakes	149	136	119	308	172	203	90	267
Cotton textiles	56	234	242	401	221	422	242	380
Cotton lint	527	220	614	336	620	330	336	336
Bananas	10	3	22	5	18	4		
Coffee	99	2	257	3	198	2		
Tea and cocoa	113	33	192	46	152	33		
Total, central plan	2,052	788	2,110	-	1,603	1,957	1,384	
Less developed:								
Wheat	1,752	294	2,380	317	1,988	734	3,003	268
Rice	658	464	603	390	234	294	925	510
Coarse grains	162	403	1,057	605	562	779	1,476	436
Oils and oilcakes	92	905	607	1,058	697	1,269	522	952
Cotton textiles	850	635	938	1,461	1,157	1,531	853	1,450
Cotton lint	322	1,389	579	1,572	777	1,612	560	1,483
Bananas	26	402	48	581	39	465		
Coffee	110	2,254	170	3,088	141	2,413		
Tea and cocoa	163	1,081	291	1,603	235	1,230		
Total, less developed	4,135	7,827	6,673	10,675	5,830	10,327		
World:								
Wheat	3,441	3,029	3,743	3,343	3,208	2,850	4,457	4,000
Rice	931	834	786	764	370	357	1,122	1,098
Coarse grains	1,927	1,756	3,172	2,818	2,459	2,122	3,721	3,338
Oils and oilcakes	2,287	1,876	4,053	3,650	4,521	3,319	3,957	3,596
Cotton textiles	1,537	1,481	2,391	2,206	2,514	2,341	2,366	2,174
Cotton lint	2,169	2,053	2,059	2,285	2,684	2,471	2,427	2,238
Bananas	628	429	941	621	759			
Coffee	2,425	2,316	3,321	3,172	2,587	2,480		
Tea and cocoa	1,181	1,114	1,749	1,648	1,332	1,263		
Total, world	16,526	14,888	22,615	20,507	20,434	17,700		

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I. Set III assumes that major developed exporters would maintain their traditional share of the world market. For both sets, export earnings or costs are on a net basis; therefore values are lower than actual levels.

percent. Thus, the projected trade balance for the LDC's in these commodities is less favorable since the growth in their import costs would exceed their growth in export earnings. To explain these trends, it is necessary to look at the commodity composition.

#### Wheat

With expected world prices close to base period values but above current (1969-70) prices, earnings in 1980 from wheat exports of less developed countries should show a slight gain from the base period. The central plan countries show a large gain, mostly reflecting the shift of the USSR from importer to exporter. In contrast, the major developed exporters lose somewhat as they curb production to maintain world base period prices.

Import costs of wheat to the less developed area will increase substantially because the demand for wheat in many of the nonproducing countries is expected to expand rapidly. Maintenance of this level would imply continued concessional export transactions and some form of aid, especially to those regions where present and foreseeable wheat technology precludes increased wheat production.

#### Rice

World trade prices for rice in 1980 are expected to drop close to 15 percent below the relatively high prices in the base period. (Scarcity of rice exports, particularly from the "rice bowl," in relation to import demand for the period 1966 through 1968, caused both absolute and relative prices to rise considerably.) Value of world trade in rice would follow a similar pattern as prospects for expanding total world rice trade are not encouraging. This situation would stem primarily from lack of growth in import markets rather than from lack of capacity of exporters to produce. A projected substantial drop in Japan's import requirements would more than offset the growing import demand in other developed countries. In addition, any possible rise in import demand in the less developed area would be limited by the combined effects of inadequate foreign exchange and rising domestic production. Consequently, import costs of the less developed importing countries are projected to be down about 8 percent by 1980. Any substantial increase in value of imports by the LDC's would necessarily have to be through concessional trade terms on the part of developed exporters.

With these import demand prospects, rice exports of Southeast Asia are projected to be about the same as in the base period, but substantially above the levels in the late 1960's. But projected export earnings for the LDC's would be down compared with those in the base period, since prices

are expected to be lower. However, such earnings would be above the level of the late 1960's. Although export earnings for 1980 in the developed world would be substantially above those in the base period, there would be little change from the value of exports in the late 1960's. A faster recovery in Southeast Asia than that projected for the area would probably result in a drop in exports of the developed area, mainly for the United States.

#### Coarse Grains

Value of world trade in coarse grains is expected to grow substantially over the next decade—at an annual rate of 3.5 percent. The growth in import demand is centered in Japan and, surprisingly, in the less developed area. The growth in import demand would be in grain for feed. World trade prices are expected to remain close to the 1964-66 average and a little above prices in the late 1960's.

Export earnings of the LDC's are expected to increase sharply, though the order of magnitude is much smaller than that for imports. These increased exports are consistent with Japan's plans to further diversify its sources of coarse grain supplies and its trade with countries who, in turn, would provide a market for Japanese goods.

The large projected gain in import demand in the less developed countries presupposes a developing commercial livestock industry likely to be concentrated around large urban centers. This import development will probably take place in large degree only if coarse grain prices are reasonable and if concessional terms of trade and other special trading arrangements are available. And it is doubtful that less developed exporters could provide such terms.

Less developed exporters, excluding Argentina, would be at a disadvantage in European markets because the distribution system there is geared to handling large grain carriers, which cannot be loaded effectively in ports of the less developed exporters.

#### Oilseeds

Although 1980 vegetable oil prices are projected to decline some 20 percent from the 1963-65 average, export earnings from vegetable oil by the less developed regions are projected to increase moderately. On the import side, however, the projected costs are substantially greater for oil-importing regions than they were during the base period. The increase in import costs would be greatest for South Asia. Projection set I assumes that oil would continue to be available under concessional terms and that policy restraints would not be imposed to reduce the level of imports.

For the less developed regions, foreign exchange earnings from oilcakes are projected to be substantially greater by 1980 than they were during the base period.

When the trade values for oil and oilcake are combined for the LDC's, both export values and import costs are projected to be higher than they were during the base period. The rise in import costs, however, will be much greater than the increase in export values. Consequently, on a net trade basis, net earnings from oilseed products are estimated to decline.

#### Cotton

Assuming a price of 26 cents per pound for cotton lint, LDC net earnings from trade in cotton lint and cotton textiles could reach \$1.5 billion by 1980—over \$600 million above the 1965-67 level. All of the projected increase in LDC export earnings from cotton accrues from increased net exports of textiles, as net earnings from cotton lint are projected to decline slightly. Hong Kong, India, the United Arab Republic, South Korea, Pakistan, and Taiwan—the largest LDC cotton textile exporters in 1965-67—can be expected to provide most of the increase in LDC export earnings.

The central plan countries are projected to have a slightly lower net import cost than in 1965-67. Increased textile imports by the USSR and lint imports by Eastern Europe will probably be more than compensated for by increased lint exports by the USSR and textile exports by Communist Asia and Eastern Europe.

In the developed area, net import costs are projected to increase to over \$1.7 billion by 1980, compared with about \$900 million in 1965-67. Most of this import cost increase would come from expansion in net textile imports by the United States and the EC.

#### Bananas

The value of world trade in bananas is expected to increase moderately over the next decade—at an annual rate of 2.7 percent. Growth in import demand in the developed countries, which account for 94 percent of world banana imports is projected to grow 2.6 percent a year. Higher rates are projected for the central plan countries (5.3 percent) and the less developed countries (4.3 percent), but these are relatively small markets. In the developed countries, growth in import demand is centered in those countries where per capita consumption is currently well below the apparent saturation level of 10 kilograms. The rapidly growing market in Japan is

expected to lead all developed markets over the next decade with its growth rate of almost 6 percent per year.

Export earnings of bananas appears to depend on how fast world demand will increase and whether supplies will be geared to this demand in such a way as to maintain present price levels. With present production technology, there does not appear to be a supply problem in most of the producing countries, since production has been increased, historically, to meet all increases in demand. The factors affecting individual country participation in the share of growing world markets are (1) factors affecting supply—disease, damage, and losses; (2) maintenance or reduction of trade restrictions in certain importing countries; (3) growth in demand in particular countries; and (4) national production and export policies in countries having comparative advantages in different markets.

#### Beverage Crops

**Coffee.**—The value of world exports of coffee is expected to increase moderately over the next decade—at an annual rate of 2.1 percent. Growth in exports to the developed countries (which account for 91 percent of world coffee imports), is projected to grow 1.8 percent a year. Higher annual rates are projected for the central plan countries (6.6 percent) and less developed countries (2.9 percent), but these are relatively small markets. In the developed countries, the highest growth rates are expected in Western Europe and Oceania, where per capita consumption is well below 4 kilograms. Growth in exports to the United States, the world's largest coffee market, is expected to increase very slowly (0.3 percent) over the next decade, primarily because of technological improvements in coffee processing that increase cup yields per pound of beans.

These projected export earnings from coffee are under the assumption that the International Coffee Agreement (ICA) will gear coffee supplies to import demand in such a way as to maintain present price levels. Prices of the principal substitutes, tea and cocoa, are also assumed to remain at base period (1964-66) levels, and current trade restrictions in certain importing countries are assumed to be maintained.

**Tea.**—The value of world trade in tea is expected to increase moderately over the next decade—at an annual rate of 2.1 percent. Growth in import demand in the developed countries (which accounted for 73 percent of world tea imports in 1964-66), is expected to grow only 1.5 percent a year. Higher rates of growth are expected in the central plan countries (1.7 percent) and the less

developed countries (3.9 percent). The net result of the different rates of growth in import demand over the next decade would be to alter the proportion of world imports accounted for by the developed countries—a decline from 73 percent in 1964-66 to 67 percent in 1980. The slower rate of growth in import demand by the developed countries indicates changes in the consumption of tea relative to coffee and cocoa projected in countries traditionally high in tea consumption, such as Japan, the United Kingdom, Australia, New Zealand, and Canada. Japan's net imports of tea would continue to increase over the next decade. World exports of tea would increase 2.2 percent a year, or slightly faster than world import demand, under the assumption that all producers would continue to participate in the growth of world demand as they did in the base period.

Cocoa.—The value of world trade in cocoa beans is expected to increase faster (3.2 percent per year) than the value for coffee or tea (2.1 percent). Growth in import demand in the developed countries (which accounted for 81 percent of world imports of cocoa beans in 1964-66) is expected to grow 2.8 percent a year. Most of this growth in the developed countries would be in the EC (3.7 percent), since slower rates of growth are projected for North America (2.1 percent) and the other developed countries (2.8 percent). Higher rates of growth are anticipated in the central plan countries, where consumption of cocoa and cocoa products is increasing rapidly along with growth in consumer income. The net results of the different rates of growth in import demand over the next decade would be to alter the proportion of world imports accounted for by the developed and central plan countries by 1980—that is, a reduction of 4 percent would occur for the developed countries and an increase of 3 percent would occur for the central plan countries. This projection for the central plan countries could be higher if any concerted efforts were made to relax existing restrictions on imports.

### Projection Set II

Projection set II was designed to measure the impact on export earnings (or import costs) of an increase in the annual growth in production in the LDC's over the growth rate in projection set I. Growth in income was assumed to increase proportionately. Other assumptions remain the same as in projection set I.

#### Wheat

The impact of an accelerated "Green Revolution" is most pronounced in two major wheat producing regions in the less developed area—Argentina and South Asia. The conditions under projection set II

would lead to a more favorable trade balance for the LDC's. The LDC's would still be net importers, but import costs would drop about one-eighth and export earnings would more than double. Argentina, a traditional exporter, would increase its share of the world market, but the dramatic change would be the shift of South Asia from a net importer to an exporter of 7 million tons of wheat. However, several important developments would be necessary for this shift to occur:

- (1) Wheat produced in South Asia (mainly India and Pakistan) would have to be of a quality acceptable in international trade. For the most part, this region produces soft wheat of a quality not suited to present baking technology.
- (2) Substantial export subsidies would be needed for South Asia to sell wheat at international price levels, because South Asia's producer prices would be relatively high compared with the world trade price. This subsidy cost could be between \$300 and \$400 million.
- (3) Traditional exporters (the United States, Canada, and Australia), no matter how reluctant, would back off from their "share" of the market, implying a loss of export earnings of close to a billion dollars. While part of this dropoff would be due to a smaller import market, most of it would be due to the entry of "new marketeers"—some LDC's.

#### Rice

Import costs of the LDC's for rice would be down substantially from the levels of projection set I, following the pattern of the other grains. But export earnings of the LDC's for rice under set II also would be down, a development which differs from the pattern for the other grains. Since most of the shipments of the less developed exporters would be to other LDC's, lowered import demand would result in lowered export earnings.

Because of unfilled caloric needs and a traditional preference for rice in the importing LDC's, a considerable amount of their increased production under this alternative would result in increased consumption and lower import demand in these countries. Even though imports would be reduced considerably, the fact that these countries would be able to absorb larger supplies domestically moderates the impact that their increased production would have on world trade. But the smaller import market would hurt the less developed rice exporters because

the bulk of their shipments usually go to the less developed world. Consequently, developed exporters (mainly the United States) would have to reduce their share in the world market considerably for world rice prices to be maintained at reasonable levels. Further downward pressures on prices would occur because of the foreign aid constraint on the import demand in the less developed countries.

#### Coarse Grains

Export earnings in the less developed countries from coarse grains would increase by about a third and import costs would be reduced by about half from the levels of projection set I. These gains would be possible since the United States, under the assumptions of projection set II, would attempt to maintain world price levels by reducing its exports as LDC's increase theirs.

Most of the gains to the less developed world would come from its increasing share of the larger developed market. Developed exporters would continue supplying a large portion of the import needs in the less developed countries, which probably implies concessional terms of trade. With lower prices, import costs to the developed world would be reduced somewhat though the volume of import trade would increase. On a net basis, world trade would drop about a fourth.

#### Oilseeds

Under this alternative, there would be little increase in vegetable oil earnings for the exporting regions, compared with the situation under projection set I. This minimal increase would occur because the projected increase in domestic demand, an increase due to higher incomes, would nearly equal the projected increase in production. On the other hand, future import costs to be paid for vegetable oils by the importing regions are estimated to be substantially above the levels obtained in projection set I. However, future export earnings from oilcakes are projected to be greater than the rise in import costs for oil. Thus, export earnings are higher under set II than they were under set I.

#### Cotton

Under the high economic growth assumption, LDC net export earnings from all cotton in 1980 are projected to be around \$300 million less than under projection set I. The decline in earnings would be equally divided between cotton lint and textiles. The decline would occur because high economic growth would cause cotton consumption to increase and exceed production. This increase in consumption would result in decreased cotton exports for many

countries, necessitating increased textile imports by the principal LDC importers. Most of the increase in textile imports would be accounted for by East and West Africa, Other East Asia, and the Pacific regions.<sup>20</sup>

The central plan countries could lower their net import costs by \$30 million under the condition of high income growth for the LDC's. This possibility would exist as a result of increased textile export earnings by the Eastern European countries and the USSR. These projections indicate that the developed countries also would benefit from higher income growth for the LDC's. Combined import cost for the developed countries would be reduced by \$250 million because of increased cotton lint exports by the United States and increased textile exports by the Western European countries and Japan.

#### Bananas

Should a concerted effort be made to expand exports faster than growth in world demand, say by 15 percent, export prices would fall by 30 percent and export earnings would decrease by 20 percent. Under these conditions, export earnings would not increase as rapidly as projected for all countries and many producers not possessing cost advantages would be forced out of production if they did not continue to have access to restrictive markets.

Producers heavily dependent on banana exports must strive for lower costs, especially less wastage, and more effective distribution of high-quality fruit if they are to successfully compete for a larger share of the world market. In some instances, improved internal transportation and port facilities will be required. Cost and timing of exports will continue to be crucial factors of competitive advantage.

#### Beverage Crops

If a concerted effort were made by the less developed countries to expand exports beyond the equilibrium levels projected under projection set I, export earnings would decline because the demand for coffee, tea, and cocoa is inelastic. The effect of a simultaneous increase in exports of all three commodities on export earnings would vary greatly. For example, if all producers of coffee, tea, and cocoa were to expand exports by, say, 15 percent, world prices would fall by 30 percent. The net effect on export earnings, after the substitution effect had

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<sup>20</sup>The projections assume that mill capacity in these regions would expand proportionately to expansion in domestic use. However, the rate of expansion under high economic growth could be greater, in which case, textile imports and net lint exports would be lower.

been accounted for, would be to (1) reduce coffee export earnings by 22 percent and increase the volume of exports by 17 percent, (2) reduce tea export earnings by 28 percent and increase the volume of exports by 2 percent, and (3) reduce cocoa export earnings by 19 percent and increase the volume of exports 16 percent. Total export earnings for coffee, cocoa, and tea would be reduced by 22 percent below the equilibrium level under projection set I.

This analysis assumes that the magnitude of the substitutional effects—cross-price elasticities—would remain constant; that is, no major change would occur in consumers' taste not already considered in these analyses.

The implication of these analyses is that tea-producing countries, for example, could not expect to increase their export earnings apart from the action of coffee and cocoa exporters. Similar implications would prevail for coffee- and cocoa-producing countries.

#### Projection Set II-A

The assumptions of projection set II are continued except that the developed exporters are assumed to adjust their production and trade policies so as to maintain their traditional share of the world market.

This alternative clearly shows that the policies of the developed exporters can greatly influence the level of export earnings and import costs of the less developed world. This implication becomes even more critical when developed exporters like the United States and Canada have a reserve area that can be expanded as well as reduced to meet production objectives without basically changing price policy. A further consideration is that these countries may even have a comparative advantage in the true sense, even though they may have export subsidies and keep domestic prices above the world level. In that case, production with reduced price levels might be higher than when production is controlled. Under projection set II-A, it is implied that there would be some drop in domestic prices in developed exporting countries to increase domestic consumption—for example, wheat for feed. However, an export subsidy would be available so that domestic prices, particularly prices to producers, would not fall as drastically as world prices.

Maintenance of world market shares by developed exporters as the "Green Revolution" accelerates in the less developed area could lead to precipitous price declines because of the relatively inelastic demand for imports at the world level. While

the quantity trade flow of the less developed exporters may be as large or larger than that under projection set I, the lower prices could cause a substantial drop in export earnings. However, prices might not drop as much as projected since the elasticities used in the projections model may be too low for these lower price levels. However, there are no statistical observations at such price levels from which to base other estimates. In addition, to hold their share of the market, it is likely that the developed exporters would make nonprice trade concessions, thereby mitigating the downward adjustment or deescalation of prices. The critical implication here is that prices would drop considerably as a result of production increase in both the less developed world and the developed countries, a determination developed among exporters to maintain a fixed share of the market.

But lower prices may be an advantage to the LDC's in terms of savings on imports. This important implication may be partly masked by the emphasis given to the export earnings of the LDC's in this report. On balance, a savings of \$100 million on imports is equivalent to earnings of \$100 million on exports. And for most of the commodities imported in large quantities by the LDC's, the lower prices under projection set II-A would bring about an import savings that could result in a more favorable trade balance than that under the other projection alternatives.

#### Projection Set II-B

In projection set II-B, freer access to developed markets is permitted because this set assumes that developed importers become more sensitive to world prices. As a result, the high internal prices of the previous sets would be lowered to be more in line with world prices. The export earnings and import costs under set II-B should be compared with those under set II-A.

Freer access to developed markets would result in increased import demand for grains. Assuming this increase were shared by developed and LDC exporters, LDC grain export earnings would increase from \$809 million in projection set II-A to \$1,251 million in set II-B. This projected increase could be conservative as it was assumed under II-B that there would not be any changes in the supply-demand relationships. Thus, these gains in the export earnings by both the developed and less developed exporters may be looked upon as a minimum. A shift to lower internal prices for grain in the importing countries could be likely to generate some pronounced changes in the food policies and strategies of the developed countries. For example, should Japan move toward a "Western food strategy" as defined by Barse (2 )

Table 22.--Export earnings and import costs for wheat, rice, and coarse grains, projections to 1980 under projection sets II-A and II-B 1/

Region and commodity	1980--proj. set II-A	1980--proj. set II-B
	Import cost	Export value
<u>Million dollars</u>		
Developed:		
Wheat	440	972
Rice	87	139
Coarse grains	1,375	962
Total, developed	1,902	2,073
Central plan:		
Wheat	297	70
Rice	55	39
Coarse grains	18	13
Total, central plan	370	122
Less developed:		
Wheat	1,103	289
Rice	305	217
Coarse grains	435	303
Total, less developed	1,843	809
World:		
Wheat	1,840	1,331
Rice	447	395
Coarse grains	1,828	1,278
Total, world	4,116	3,003

1/ Set II-A assumes that major developed exporters would maintain their traditional share of the world market. Set II-B assumes that the major developed importers would become more sensitive to world grain prices and adjust their high internal prices to changes in world prices. Earnings and costs for both sets are on a net basis; therefore, values are lower than actual levels.

and the diet in Japan become westernized, Japan's imports of grains would greatly exceed the amounts projected in set II-B. Another factor that might improve export earnings of the LDC's as a result of their freer access to markets of developed importers would be special considerations given them, thereby channeling more of the gains to these countries.

### Projection Set III

In this projection set, the "Green Revolution" was assumed to be short lived, and annual growth in production in the LDC's was assumed to decrease over the rate of projection set I. The implications drawn from this set should be compared with those of projection set III.

#### Grains

The major implications for the less developed countries are a sharp reduction in their export earnings and a substantial increase in import costs which could be softened by concessional terms from developed exporters. Thus, under projection set III, export earnings for grains would decrease since the fall in exports more than offsets the increase in prices resulting from adjustments by the developed exporters. Furthermore, the higher world prices would adversely affect the less developed importers because reduced production would slow economic growth, which adds to the difficulty of importing food. To reduce the calorie gap, sizable concessional trade would be needed. On balance, this alternative shows that even if production in the LDC's should falter and have adverse effects on their economic development, production capacity in the developed world would be sufficiently large to prevent any real rise in grain prices.

#### Oilseeds

The estimated 1980 net export earnings from oilseeds products are lower under projection set III than they were for both of the other sets. This reduction would occur because of a sharp decline in earnings from oilcake exports. For vegetable oil, demand was projected to drop faster than production. As a result of the increased export availabilities of oil, net earnings for vegetable oil would be somewhat higher under set III than under the other two sets.

It should be noted that although the estimated per capita consumption levels of vegetable oil are lower under set III than they were under the other two sets, the levels under set III are still higher than the per capita consumption levels during the 1963-65 period.

#### Cotton

A lower than expected economic growth rate in the LDC's would have little effect on their earnings from all cotton products. In fact, projected net earnings for projection set III are slightly above the levels in set I. LDC textile imports would decline somewhat and total lint exports would also fall a little. Within the central plan countries, textile exports and lint imports in Eastern Europe would both fall somewhat, causing net import costs for the region to rise somewhat above those in set I. In the developed countries, the lower LDC income would have little effect. Total import costs would increase slightly, resulting from decreased textile imports from the United States and Other Western Europe.

## VIII.—CONCLUSIONS

Prospects for export earnings or import costs of the LDC's differ materially among the several sets of projections. Some of the prospects can be summed up in general terms, common to most or all commodities, while others are specific to certain commodities or commodity groups. These two classes of implications are summarized below under the headings General Implications and Commodity Prospects.

Projections on which the following findings are based were presented as numerical results in the foregoing discussions, but the findings are significant chiefly in relative terms, indicating directions and approximate magnitudes. The numbers are not

precise estimates of levels and distribution of agricultural exports that would maximize export earnings or minimize import costs to the LDC's.

The projections, and implications flowing out of them, rest on varying premises as to general economic development, production growth rates for individual commodities, and policies that may be followed by major traders. Projection set I represents, in a sense, a "normal" expectation—the course of trade and earnings if development remains within the relatively narrow range of the path it has followed in the past 10 to 15 years. This projection set provides a reference point for the other sets, which explore the likely consequences of plausible alternative rates of

growth or policies of major developed traders.

### General Implications

1. Supplies of most foods and fibers appear likely to exceed demand at current prices. Prices are likely to decline, therefore, unless major suppliers adjust production or marketing.
2. Much of the increase in production of food and fiber in the LDC's would be absorbed by an increase in domestic consumption.
3. Per capita nutritional levels of the LDC's may be expected to improve.
4. Demand of the LDC's for agricultural imports may increase rapidly, particularly for commodities they do not produce; the LDC's could account for an increasing share of world agricultural imports.
5. Increased LDC imports would be contingent on concessional sales of foods, feeds, and fibers to the LDC's.
6. The relationship between world price levels and volume of trade may be indeterminate under certain conditions: Lower world prices may be associated with decreased trade if production increases occur in importing countries (as is expected in rice) and lowers import demand. Lower world prices may be associated with increased trade if production increases in exporting countries and increases exports.
7. Increased exports of commodities with an inelastic price elasticity of demand at the world level may be associated with lower export earnings.
8. Export earnings for commodities supplied only, or principally, by LDC's—such as tropical fruits and beverages—are expected to rise with projected income growth in importing countries under continuation of current price and export policies. If exports were increased relative to growth in demand, prices and export earnings would be reduced. Reduced exports, relative to growth in demand, might raise prices and export earnings, but consumption of substitutes might rise, which would weaken the prospects for gains in earnings.
9. LDC's earnings prospects for commodities supplied by both LDC's and developed exporters can be drastically affected by the policies of the latter. The optimum strategy for LDC's would be to increase exports to the point that major developed exporters might find it expedient to accommodate, possibly through some cooperative international effort. Expanding exports beyond that point may stimulate the developed exporters to adopt policies represented in projection set II-A, with adverse effects on LDC export earnings.
10. Benefits to LDC's from removal of restrictions and freer trade may be minimal if developed exporters share in the resulting trade increase unless special trade arrangements are made in favor of the LDC's. Specifically, in the case of grains, where the developed exporters have the largest share of the market, they would gain relatively more from an expanded import market than the LDC exporters with current market shares.
11. Accelerating production in the face of falling export earnings could lead to conflict or inconsistency of assumptions. For example, lower export earnings would discourage economic growth. This is contrary to the assumption made under projection set II, where both production and economic growth are assumed to increase.
12. LDC's may find it difficult to achieve a consensus on trade policy, since the less developed area includes both importers and exporters. Lower world prices benefiting importers would adversely affect exporters, and higher world prices benefiting exporters would adversely affect importers.

### Commodity Prospects

1. Wheat—Fair. Import demand will be sluggish in the developed area but potentially strong in the LDC's if concessional terms of trade are available. Increased feed use of wheat would reduce downward pressure on prices. Some increase in share of world market would be possible for LDC exporters, largely Argentina. Subsidy costs and quality factors could offset potential export earnings in South Asia.

2. Rice—Poor. The “Green Revolution” would result in lower world import demand, a

demand centered in the LDC's. Import demand in the developed area is expected to rise moderately but the increase is small relative to potential supplies for exports—from both developed and less developed exporters. Consequently, continued downward pressures on prices are expected.

3. Coarse grains—Good. Import demand in developed areas, particularly Japan, is expected to be strong. Given concessional terms of trade, import demand of the LDC's could increase sharply as a result of a rapidly expanding livestock industry in these countries. Lower internal grain prices in developed importing areas, particularly the EC, could give trade an additional boost. Some LDC exporters might not fully share in the expansion because their port facilities are limited in handling large cargo vessels. On the other hand, maintenance of very high internal prices through limited access could lead to self-sufficiency in total grains in the EC, thereby lowering export prospects.

4. Oilcake and Oils—Fair. Import demand will be strong for oilcake. High grain prices in developed importing countries (particularly the EC), make oilcake an attractive feed substitute. World import demand for oil is expected to be weak. A larger import demand for oils could occur in the LDC's, contingent on the level of concessional sales.

5. Cotton—Good. Developed area import demand will be strong for textiles but weak for lint. The LDC's are expected to increase consumption of both textiles and lint, but domestic demand for textiles could be weak if economic growth rates falter. LDC exports of textiles and lint are expected to increase the LDC share of the world market. Demand for manmade fibers is expected to increase more rapidly than that for cotton.

6. Bananas—Good. Import demand will be sluggish in highly developed countries but potentially good to strong in rapidly growing developed countries where per capita consumption is rising rapidly under the impetus of rising income. Lower prices would stimulate the volume of exports but might actually reduce export earnings of the LDC's.

7. Tropical Beverages—Fair. Import demand for coffee will be sluggish in the United States but stronger in other developed countries where substitution of coffee for tea is apparent. Growth in import demand for tea will be sluggish in developed countries but good in LDC's. Total export earnings prospects for tea are generally fair to poor. Import demand for cocoa is expected to be good—an expected growth in consumption in Western European and central plan countries will expand export potentials. Export potentials could be further enhanced with reductions in import restrictions in these countries.

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\* Part of a study conducted under contract with the USDA as part of a series to evaluate long-term supply and demand prospects for agricultural products throughout the world. The complete study may be obtained on request from the Division of Information, Office of Management Services, U.S. Dept. of Agriculture, Wash., D.C. 20250.

## LIST OF REGIONAL AGGREGATION

Developed

1. United States
2. Canada
3. European Community..... Belgium-Luxembourg, France, Fed. Rep. of Germany, Italy, Netherlands.
4. United Kingdom
5. Other Western Europe..... Austria, Denmark, Finland, Greece, Iceland, Ireland, Malta, Norway, Portugal, Spain, Sweden, Switzerland.
6. Japan
7. Australia and New Zealand
8. South Africa, Rep. of

Central Plan

9. Eastern Europe..... Albania, Bulgaria, Czechoslovakia, Germany (E), Hungary, Poland, Romania, Yugoslavia.
10. U.S.S.R.
11. Communist Asia..... Mainland China, Mongolia, North Korea, North Vietnam.

Less Developed

12. Central America & Mexico..... British Honduras, Caribbean including Cuba, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama.
13. South America..... Argentina, Bolivia, Brazil, French Guiana, Paraguay, Surinam, Uruguay, Venezuela, Chile, Colombia, Ecuador, Peru, Guyana.
14. East and West Africa..... Botswana, Burundi, Ethiopia, Kenya, Lesotho, Malagasy Rep., Malawi, Mauritius, Mozambique, Rhodesia, Rwanda, Somalia, Swaziland, Tanzania, Uganda, Zambia. Angola, Cameroon, Central African Rep., Chad, Congo (Kinshasa), Congo (Braz.). Dahomey, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Portuguese Guinea, Senegal, Sierra Leone, Togo, Upper Volta, Other Portuguese West Africa.
15. North Africa & West Asia..... Algeria, U.A.R. (Egypt), Libya, Morocco, Sudan, Tunisia, Bahrain, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Muscat & Oman, Qatar, Saudi Arabia, South Yemen, Syria, Trucial States, Turkey, Yemen.
16. South Asia..... Afghanistan, Bhutan, Ceylon, India, Nepal, Pakistan.
17. Southeast Asia..... Burma, Cambodia, Laos, South Vietnam, Thailand.
18. East Asia & Pacific Is..... Brunei, China (Taiwan), Hong Kong, Indonesia, South Korea, Macau, Malaysia, Pacific Islands, Papua, Philippines, Singapore.





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Results of the project of which this report is a part have been published as follows by the Economic Research Service:

World Trade in Selected Agricultural Commodities, 1951-65--

Vol. I.--Beverage Crops: Coffee, Cocoa, and Tea.  
Foreign Agr. Econ. Rpt. 42, June 1968

Vol. II.--Food and Feed Grains: Wheat, Rice, Maize, Barley, and Other Cereals.  
Foreign Agr. Econ. Rpt. 45, June 1968

Vol. III.--Textile Fibers: Cotton, Jute, and Other Vegetable Fibers. Foreign  
Agr. Econ. Rpt. 543, June 1968

Vol. IV.--Sugar, Fruits, and Vegetables. Foreign Agr. Econ. Rpt. 44, June 1968

Vol. V.--Oilseeds, Oil Nuts, and Animal and Vegetable Oils. Foreign Agr. Econ.  
Rpt. 47, Aug. 1968

Japan's Food Demand and 1985 Grain Import Prospects. Foreign Agr. Econ Rpt. 53,  
June 1969.

World Demand Prospects for Agricultural Exports of Less Developed Countries in 1980,  
Foreign Agr. Econ. Rpt. 60, June 1970.

Copies of these reports may be obtained upon request to the Division of Information,  
Office of Management Services, U.S. Department of Agriculture, Washington D.C. 20250.

Additional reports are being developed on the following as part of the overall research  
project: World demand prospects in 1980 for wheat; rice; feed grains; total grains;  
cotton; oilseed and meal; citrus fruits; coffee, tea, and cocoa; and bananas; the  
Japanese grain-livestock economy; and world agricultural import barriers. Publication  
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